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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES



AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during October, 1969.





INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA) and NASA Scientific and Technical Information Facility. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, Aerospace Medicine and Biology concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry consists of a standard citation accompanied by its abstract in the following order:

- a. NASA entries identified by their STAR accession numbers (N69-10000 series), and
- b. AIAA entries identified by their IAA accession numbers (A69-10000 series).

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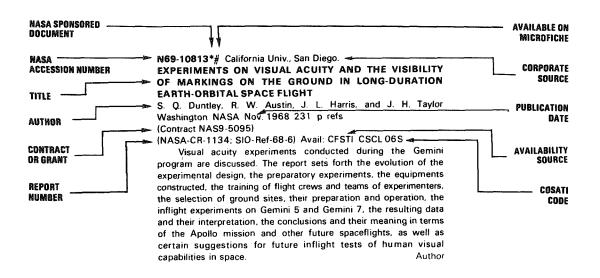
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For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

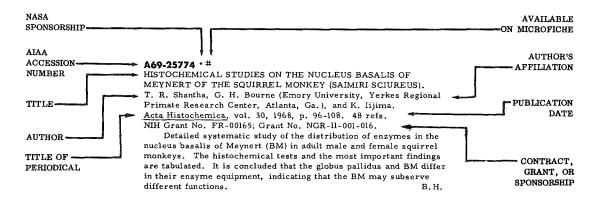
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TYPICAL CITATION AND ABSTRACT FROM IAA





AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography

NOVEMBER 1969

STAR ENTRIES

N69-33241# Explosives Research and Development Establishment, Waltham Abbey (England).

THE TESTING OF SAFETY SPECTACLES, LENSES, GOGGLES AND VISORS, PART 2

L. D. Cole and R. Pape Oct. 1968 43 p refs

(AD-687224; ERDE-10/M/68) Avail: CFSTI CSCL 6/17

Fifteen types of spectacles, goggles and visors have been tested for resistance to glass fragments driven by explosive charges, six types to the explosion of bare detonators and six types to glass flasks burst by nitrogen pressure.

N69-33260*# National Aeronautics and Space Administration.
Manned Spacecraft Center, Houston, Tex.

A REVIEW OF SPACECRAFT WASTE-MANAGEMENT SYSTEMS

W. W. Kemmerer, Jr. and Jon W. Morar Washington Aug. 1969 14 $\,\mathrm{n}$

(NASA-TM-X-1851) Avail: CFSTI CSCL 05E

This document reviews the design requirements, development, and use of the waste-management systems for Project Mercury and for the Gemini Program. A review of the use of these systems during actual missions is included.

Author

N69-33379# Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.

FOOD CONSERVATION BY IRRADIATION EXPOSURE [LA CONSERVATION DES ALIMENTS PAR IRRADIATION]

E. Denti and E. Zimmer 1968 15 p In FRENCH Presented at Reunion Europack, Varese, Italy, 21 Jun. 1968 (SORIN-149; M /354) Avail: CFSTI

Several types of food, beef, pork, poultry, and fish were studied for the changes irradiation treatment made in their preservation. Fruits were also studied. The results show germination inhibition of bulbs and nodules, slowing of fruit maturation, conservation of orginal vegetable foods, and partial or total destruction of microorganisms as some of the positive aspects of the food preservation study. The temperature factor and the length of time the food was to be preserved were also taken into consideration.

Transl. by E.H.W

N69-33384# Educational Testing Service, Princeton, N.J. ROBBINS-MONRO PROCEDURES FOR TAILORED TESTING

Frederic M. Lord Mar. 1969 45 p refs (Contract N00014-69-C-0017)

(AD-687471; RB-69-18) Avail: CFSTI CSCL 5/10

Tailored testing tries to choose for administration items at a difficulty level matching the examinees ability, which is inferred from his responses to items already administered. Robbins-Monro procedures for selecting items and for estimating the examinees ability are evaluated. Various ideas of use for tailored testing emerge.

Author (TAB)

N69-33390# Library of Congress, Washington, D.C. Aerospace Technology Div.

RESPONSE OF THE NERVOUS SYSTEM TO MICROWAVE RADIATION

Vladimir Mutschall *In its* Foreign Sci. Bull., Vol. 5, No. 6 Jun. 1969 p 18 – 55 refs (See N69-33388 19-16) Avail: CFSTI

Current Soviet research on the effects of microwave radiation on the mammalian nervous system is reviewed. Author

N69-33392*# Public Health Service, Phoenix, Ariz. Nationa Communicable Disease Center.

REDUCTION OF MICROBIAL DISSEMINATION GERMICIDAL ACTIVITY OF ETHYLENE OXIDE Summary Progress Report Number 12

Apr. 1969 9 p (NASA Order R-137)

(NASA-CR-103822) Avail: CFSTI CSCL 06C

Development of techniques for recovering and culturing airborne particulates containing *Clostridium perfringins* are discussed. The reinforced clostridial agar showed the best results of seven different agar bases that were screened. Naturally airborne microorganisms were collected with exposed filters assayed for approximate number of viable particulates and with the remaining filters subjected to ethylene oxide sterilization. Filters exposed to ethylene oxide were cultured aerobically in 10% CO ₂at 37°C and examined for growth following 14 and 28 days of incubation. No surviving microorganisms were observed.

N69-33393# Joint Publications Research Service, Washington, D.C.

RADIOBIOLOGY

Oak Ridge, Tenn. AEC 1968 244 p refs Transl. into ENG-LISH of Radiobiologiya (Moscow), v. 8, no. 4, 1968 p. 1–238 (AEC-TR-7014) Avail: CFSTI

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- 7. SOME PECULIARITIES OF THE WEIGHT CHANGE OF GROWING ANIMALS AFTER A RADIATION INFLUENCE V. V. Kholin p 47-51 refs
- 8. AN EXPERIMENT ON CHRONIC γ -IRRADIATION OF RATS WITH A VARIABLE DAILY DOSE OF THE INFLUENCE V. N. Malakhovskii, A. I. Laptev, A. F. Khoruzhenko, I. G. Oreshkin, and V. A. Rezontov p 52–59 refs (See N69-33394 19-04)
- 9. REGENERATION OF STOMACH MUSCLE TISSUE AFTER THE APPLICATION OF MECHANICAL TRAUMA DURING THE EARLY PERIODS OF ACUTE RADIATION SICKNESS N. I. Verzhbitskaya p 60-67 refs
- 10. BIOCHEMICAL CHANGES IN THE LUNGS OF RABBITS AFTER INHALATION OF PLUTONIUM I. V. Tseveleva, R. E. Libinzon, G. S. Mushkacheva, T. N. Rysina, and A. G. Surina p 68–76 refs
- 11. CHANGES IN THE BLOOD OF BIRDS IRRADIATED WITH FAST NEUTRONS P. Dryanovskii, K. Kovachev, V. Popov p 77-84 refs
- 12. DYNAMICS OF THE CHANGES IN THE BACKGROUND AND INDUCED ELECTRICAL ACTIVITY IN THE VISUAL SYSTEMS OF THE RABBIT BRAIN DURING IRRADIATION K. Sh. Nadareishvili and O. S. Bakradze p. 85–98 refs
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- 17. RADIOPROTECTIVE EFFECT OF SALTS OF S-ALKYLSUBSTITUTED DERIVATIVES OF ISOTHIOUREA IN THE CASE OF SEPARATE AND COMBINED ADMINISTRATION P. G. Zherebchenko, Yu. D. Zil'ber, G. P. Pospekhova, F. Yu. Rachinskii, N. M. Bogacheva and N. K. Val'chuk p 187–189 refs
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- 21. INFLUENCE OF TEMPERATURE SHOCKS ON THE FRE-QUENCY OF CHROMOSOME ABERRATIONS INDUCED BY IR-RADIATION OF DORMANT SEEDS R. R. Atayan p 158–165 refs
- 22. RADIOSENSITIVITY OF SOLUTIONS OF DOUBLE-STRANDED DEOXYRIBONUCLEIC ACIDS V. A. Struchkov and N. B. Strazhevskaya p 166–167 refs
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- 28. INFLUENCE OF IRRADIATION BY INTERMEDIATE-ENERGY NEUTRONS ON THE CONTENT OF $\gamma-ACID$ IN THE CEREBRAL CORTEX V. I. Malashko p 190–192 refs
- 29. DIHECI AND MEDIATED INFLUENCE OF RADIATION ON THE TRANSMISSION OF EXCITATION IN THE UPPER CERVICAL SYMPATHETIC GANGLION OF THE CAT A. V. Mtskhvetadze and T. M. Kucherenko p 193–199 refs
- 30. REACTIVITY OF ANIMALS SURVIVING AFTER ACUTE RADIATION SICKNESS AS A RESULT OF SHIELDING OF PART OF THE BONE MARROW AND SUBSEQUENT AUTOTRANS-PLANTATION OF IT INTO THE BLOODSTREAM N. V. Kozlova and N. K. Shmidt p 200–203 refs
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- 32. DYNAMICS OF THE ACCUMULATION AND ELIMINA-TION OF STRONTIUM-90 FROM THE RAT SKELETON DEPEND-ING UPON THE AGE OF THE RATS IN CHRONIC EXPERIMENTS V. L. Shvedov p 208–212 refs
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- 36. INFLUENCE OF RADIATION ON THE PROLIFERATION AND DIFFERENTIATION OF CELLS I. L. Chertkov p 225–231 (See N69-33396 19-04)

N69-33394# Joint Publications Research Service, Washington, D.C.

AN EXPERIMENT ON CHRONIC GAMMA-IRRADIATION OF RATS WITH A VARIABLE DAILY DOSE OF THE INFLUENCE

V. N. Malakhovskii, A. I. Laptev, A. F. Khoruzhenko, I. G. Oreshkin, and V. A. Rezontov *In its* Radiobiol. 1968 p 52 –59 refs (See N69-33393 19-04)

Avail: CFSTI

A total of 298 rats were subjected to chronic γ -irradiation with linear variation of the daily dose in the direction of a decrease for one group of animals (series A) and in the direction of an increase for the other (series B). At the same time, a model was formulated: the contribution of each daily fraction to the cumulative effect of irradiation is determined by the size of the fraction with its characteristic effectiveness. A prognosis made on the basis of the proposed model basically coincided with the actual experimental results. The differences in death rate between series A and B proved to be directly opposite to what were expected on the basis of the widespread Blair – Davidson hypothesis.

N69-33395# Joint Publications Research Service, Washington, D.C.

INITIAL MECHANISMS OF THE DEVELOPMENT OF RADIATION DAMAGE TO THE CELL

Avail: CFSTI

Physiochemical aspects of the origin and development of radiation damage in the cell were studied. The significance of the target theory as a mathematical analysis of a strictly unlimited circle of phenomena was emphasized. The nonequivalence principle is proposed for reflecting phenomena that occur during irradiation of a cell. While the role of free radicals, chain processes, intercellular membranes, and radiotoxins are discussed, emphasis is placed on the damage and the recovery of DNA to irradiation.

J.A.M.

N69-33396# Joint Publications Research Service, Washington, D.C.

INFLUENCE OF RADIATION ON THE PROLIFERATION AND DIFFERENTIATION OF CELLS

I. L. Chertkov *In its* Radiobiol. 1968 p·225 –231 (See N69-33393 19-04)

Avail: CFSTI

The physiological regeneration of hematogenetic tissue and intestinal epithelium, after irradiation, is reviewed. Biochemical aspects of radiation action and postradiation recovery, hematogenetic stem cells, hematogenesis (development and differentiation of hematogenetic cells), lymphopoiesis and its immune response, and tumor cells are also discussed.

J.A.M.

N69-33423*# Naval Aerospace Medical Inst., Pensacola, Fla. Medical Center.

VESTIBULAR RESPONSES TO SINUSOIDAL ANGULAR ACCELERATION STIMULI WITH SUPERIMPOSED OFFSET VELOCITIES

Jorma I. Niven and W. Caroll Hixson 2 Apr. 1969 14 p refs (NASA Order R-93)

(NASA-CR-103793; NAMI-1065) Avail: CFSTI CSCL 06S

Thirty subjects were exposed to a sinusoidal rotation stimulus of 0.025 cps and a peak velocity of 63 deg/sec, which was superimposed on a constant rotational velocity of 153 deg/sec clockwise (CW), 153 deg/sec counterclockwise (CCW), or 0 deg/sec. The phase lag of nystagmus and sensation directional transitions was determined and used to derive a functional index. Nystagmus-based values were found to be independent of the base velocity and its direction. The phase lag of the CCW-to-CW transition in sensation of turning increased with a CCW offset velocity and decreased with a CW offset. The opposite effect was observed for a CW-to-CCW transition.

N69-33523*# Stanford Univ., Calif.

EVALUATION OF THE CARDIOVASCULAR SYSTEM DURING VARIOUS CIRCULATORY STRESSES Progress Report, 1 Sep. 1968–1 May 1969

Donald C. Harrison, Harold Sandler, Lewis Wexler, and Robert Goldman 1 May 1969 12 p refs (Grant NGR-05-020-305)

(NASA-CR-103789) Avail: CFSTI CSCL 06P

Cardiac reserve before and after myocardial infarction was evaluated by studying drug responses in experimental animals. Observed were elevated arterial pressure, heart rate performance, and stress effects produced by coronary artery ligation. Circulatory responses to dopamine, lidocaine, and morphine chemotherapy indicated that dopamine was the preferable agent for the treatment of severely depressed cardiac function following acute myocardial infarction and that the infusion of lidocaine seemed to be the best therapy in patients with comprised circulatory function after the infarct. Morphine sulfate injections in dogs after acute myocardial infarction produced sustained hear rate decreases and heart rate outputs. Also performed were studies with implanted ultrasonic flow transducers and reflected ultrasound for evaluating cardiac performance in man and animals. The use of ultrasound for detecting changes in the transplanted human heart centered on immunological rejection changes with thickening of the left ventricular wall.

N69-33527*# California Univ., Berkeley. Lawrence Radiation Lab. JOINT NASA-AEC PROGRAM IN SPACE RADIATION BIOLOGY Progress Report, Fall 1967

Sep. 1967 139 p refs Prepared jointly with NASA (NASA ORDER R-104; Contract W-7405-eng-48) (NASA-CR-103674; UCRL-17751) Avail: CFSTI CSCL 06R

The data presented pertain to molecular and cellular studies, radiation effects in space flight, radiological physics, and mammalian radiobiology and neuroradiobiology. For individual titles, see N69-33528 through N69-33546.

N69-33531*# California Univ., Berkeley. Lawrence Radiation Lab. EFFECTS OF HOMOGENEOUS MAGNETIC FIELDS UPON BIOLOGICAL SYSTEMS

Nabil M. Amer In its Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 25-28 refs (See N69-33527 19-04) Avail: CFSTI CSCL 06R

The hypothesis that the effects of homogeneous magnetic fields on the development of $\it Tribolium confusum$ incubated at constant ambient temperature were quantitatively equivalent to an intrinsic cooling effect of the order of 1 $^{\circ}$ C/6000 gauss was tested with substances with mesomorphic states, which when cooled have the characteristic of changing their light-scattering properties as a function of temperature. The change is expressed in a shift of the wavelength of scattered light. When a mesomorphic state with a range of coloration between 34 $^{\circ}$ and 37 $^{\circ}$ C was maintained at an ambient temperature of 37 $^{\circ}$ C ± 0.1 $^{\circ}$ and an external magnetic field of 6.3 kG was applied to the preparation, a gradual change in the wavelength of the scattered light was obtained (a shift from 4600 to 6200 Å). K.R.G.

N69-33532*# California Univ., Berkeley. Lawrence Radiation Lab.
THE EFFECT OF VARIOUS LET RADIATIONS ON STEM
CELLS AS MEASURED BY THE SPLEEN COLONY-FORMING
TECHNIQUE

Jose M. Feola and John C. Schooley *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 29-36 refs (See N69-33527 19-04)

Avail: CFSTI CSCL 06R

A series of experiments dealing with irradiations of bone marrow cells in suspension and assay in vivo by the spleen colony-forming method were performed. The LAF₁ female mice were irradiated at 1.22 meters from a ^{6Q}Co source at a dose rate of 12.5 R/min in air. A dose of 1150 rads was given to all recipient mice. After irradiation, groups of five mice were housed in sterilized cages and allowed to drink chlorinated water containing 0.5% to 1.0% Terramycin. Results are based from a series of preliminary experiments. Survival curves obtained by irradiation of the bone marrow cells with X-rays are in good agreement with published reports. Results obtained by irradiation with helium-4 ions are in good agreement with previous results with tumor cells.

N69-33533*# California Univ., Berkeley. Lawrence Radiation Lab. SYNERGISTIC ACTION OF X-RAYS AND ULTRASONIC WAVES ON MAMMALIAN CELLS CULTURED IN VITRO

Bambino I. Martins *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 37-41 (See N69-33527 19-04) Avail: CFSTI CSCL 06R

Experiments were performed to elucidate the nature and mechanism of the action of ultrasound and the relationship of such action to that of ionizing radiation. The work was done with mammalian cells from a Chinese hamster bone marrow cell line (M3-1) cultured in vitro. The following conclusions were made based on the experimental data: (1) There is a threshold intensity of ultrasound which is required for cell death. Above this threshold intensity the number of surviving cells falls off with increasing intensity. (2) The threshold intensity, as measured in terms of power input to the crystal, depends on the frequency. (3) Even at intensities below threshold there is sublethal damage as indicated by the observation that such cells are affected differently from nonsonicated cells when irradiated later with 50-kVp X-rays. (4) A synergistic effect between ultrasound and X-rays is demonstrated. The degree of synergism depends on the intensity and frequency of ultrasound and the X-ray dose. The synergistic effect is much more evident if the ultrasound follows rather than precedes X-rays; in this case a subthreshold dose of ultrasound causes markedly more lethality than X-rays alone. KRG

N69-33534*# California Univ., Berkeley. Lawrence Radiation Lab. EFFECT OF RADIATION ON THE DEVELOPING FLOUR BEETLE. TRIBOLIUM CONFUSUM

Brenda M. Buckhold and John V. Slater *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 43–53 (See N69-33527 19-04)

Avail: CFSTI CSCL 06R

A developmental abnormality was studied in the flour beetle, Tribolium confusum. When irradiated with 2000 R of X-rays or γ-rays, young pupae develop into adults having a wing abnormality which consists of a median elytral split, elytral blistering, and protrusion of the underlying membranous wings. Various physical and chemical parameters, such as temperature, O2 tension, and magnetic fields, were shown to alter this response to radiation. One of the parameters studied in detail has been temperature, with which a synergistic effect was found in terms of percentage of wing abnormalities obtained with radiation. Another point of interest is the variation in sensitivity to X-rays (measured by percent wing abnormality) according to the age of the beetles. Larvae are somewhat sensitive to X-rays as far back as 50 hr prepupation, but the sensitivity more than doubles at about 24 hr prepupation. Pupae have two periods of maximum sensitivity at about 10 and 24 hr postpupation, and sensitivity drops to control values at about 30 hr postpupation. K.R.G.

N69-33536*# California Univ., Berkeley. Lawrence Radiation Lab. ENERGY-LOSS FLUCTUATIONS

Howard D. Maccabee In its Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 59-61 refs (See N69-33527 19-04)

Avail: CFSTI CSCL 06R

The phenomena of energy-loss fluctuations in traversals by different particles through absorbers has been investigated. A body of theory predicts the energy-loss probability distribution, depending on the number of collisions in the highest (and therefore least frequent) collision energy group. The parameter k is a measure of the number of high-energy collisions. The theory has been verified conclusively only at its end points, i.e., for large k (slower) particles in thicker absorbers) and for small k (faster particles in thinner absorbers). In the intermediate region, Vavilov's theory is believed valid, but the experimental evidence has been sparse. The energy-loss distributions were measured for k from 0.003 to 2.23, using 45 MeV and 730 MeV protons, 370 MeV π mesons. and 910 MeV He $^{+}\mathrm{2}$ ions in silicon semiconductor detectors of various thicknesses. Good agreement was found with the Vavilov theoretical distributions, and good agreement on the values of the most probable energy loss.

N69-33537*# California Univ., Berkeley. Lawrence Radiation Lab. SIMULATED SOLAR-FLARE IRRADIATION IN THE LABORATORY

John T. Lyman *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 63-76 refs (See N69-33527 19-04) Avail: CFSTI CSCL 06R

In order to assess the effects of lunar mission hazards presented by large solar flares which eject high fluxes of protons and helium ions, a solar flare simulation laboratory apparatus was devised. The 910 MeV helium ion beam from the 184-inch synchrocyclotron was chosen. In order to produce a total-body irradiation of the experimental test animal, it is necessary to either enlarge the beam by magnetic scanning or by scattering, so that the beam diameter is greater than the major dimensions of the animal, or to mechanically scan the animal across a small beam. Mechanical difficulties and stress to the animal make the latter procedure impractical. Because of the relative simplicity of the method, scattering the beam was chosen. Further details on adjustment and calibration of the apparatus are given.

N69-33538*# California Univ., Berkeley. Lawrence Radiation Lab. BEAM SCANNING AND MICROBEAM AT THE 88-INCH CYCLOTRON

Graeme P. Welch *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 77-82 (See N69-33527 19-04) Avail: CFSTI CSCL 06R

The α -particle beam of maximum energy 120 MeV and proton beam of maximum energy 55 MeV from the 88-inch sector-focused cyclotron covers approximately 0.5 cm diameter at the target position but is quite inhomogeneous in intensity over its cross section. For small targets, scattering by a thin aluminum or graphite foil has been used to obtain approximate uniformity and to increase the area covered, but the useful field is limited, a great deal of intensity is lost, the background is increased, and the energy spread and rate of energy loss spread are increased. For whole-skin irradiation of animals, scattering to increase beam size is impractical. A practical experimental technique devised involves repetitive deflection of the beam in two perpendicular directions at different frequencies to cover a large surface (up to 12 inches square in the present design) together with a slow rotation of the animal about a longitudinal axis. This scanning system is also useful for small-animal irradiations and removes the limitations of K.R.G. the scattering method.

N69-33539*# California Univ., Berkeley. Lawrence Radiation Lab. SPACE-RELATED MAMMALIAN RADIOBIOLOGY

Henry Aceto *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 83-95 refs (See N69-33527 19-04) Avail: CFSTI CSCL 06R

Results are presented for studies on the combined effect of proton irradiation and hypoxia on beagles and studies involving heavy-ion whole body skin irradiation of mice. A germ-free research program has been initiated to examine the significance of radiation-induced infection and the role it plays in the radiation syndrome, especially in terms of long duration space flights. Pilot experiments have been performed to ensure the adequacy of techniques and procedures for this work. In these experiments, Charles River CD-1 germ-free mice demonstrated an increased radioresistance to $^{60}{\rm Co}$ γ rays as expressed by a higher median lethal dose than that for conventional animals. These results indicate a general agreement with earlier studies from other laboratories.

N69-33540*# California Univ., Berkeley. Lawrence Radiation Lab. VESTIBULAR ORGANS: THE STRUCTURE AND FUNCTION OF THE VESTIBULAR ORGANS AS THEY RELATE TO THE MANNED EXPLORATION OF SPACE

Larry W. McDonald and Robert G. Plantz *In its* Joint NASA-AEC Program in Space Radiation Biol. Sept. 1967 p 97-108 refs (See N69-33527 19-04)

Avail: CFSTI CSCL 06P

As a preliminary step in a series of experiments designed to evaluate the effect of space radiation on vestibular structure and function, normal structure and function is examined and summarized.

K.R.G.

N69-33541*# California Univ., Berkeley. Lawrence Radiation Lab. VESTIBULAR ORGANS: TESTING THE FUNCTION OF VESTIBULAR RECEPTORS

Robert G. Plantz and Larry W. McDonald *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 109–116 refs (See N69-33527 19-04)
Avail: CFSTI CSCL 06P

The vestibular system is considered as a black box and attempts are made to describe its function from input—output data. A morphological study of the vestibular system suggested that the sensors are spring-mass systems with considerable friction. The natural input for such a system is acceleration (angular for the semicircular canals and linear for the otoliths); the system dynamics are described by a second order differential equation, if it is a linear system. Van Egmond's equation for the horizontal canal with zero input acceleration is examined. A series of experiments describing the measurement of semicircular canal function is reported. K.R.G.

N69-33542*# California Univ., Berkeley. Lawrence Radiation Lab. VESTIBULAR ORGANS: RADIATION EFFECTS ON STRUCTURE AND FUNCTION

Larry W. McDonald and Robert G. Plantz *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 117–122 refs (See N69-33527 19-04)

Avail: CFSTI CSCL 06R

In studies using postrotational nystagmus, whole-body ⁶⁰Co gamma irradiation of rabbits was associated with an increase in the variability of the test results as radiation sickness progressed.

A group of 8 animals was irradiated in this way and those receiving 250 to 500 rad showed definite effects as evidenced by increased statistical variation in the postrotational nystagmus response. Radiographic studies of rabbits' heads were made in order to localize the cyclotron-produced particle beam radiation to the vestibule. When either whole-head or localized vestibular irradiation was used in the rabbit, fairly high doses were required to regularly produce alterations in postrotational nystagmus. Control animals often showed periods of several days when they had an increased postrotational response. In electron micrographs, no definite abnormalities in cilia were detected. The most marked finding was the increase in capillary basement membrane thickness, often more than 150 m μ , and the presence of increased amounts of interstitial space. K.R.G.

N69-33543*# California Univ., Berkeley. Lawrence Radiation Lab. THE RIGHTING REFLEX OF THE FROG AS INFLUENCED BY IRRADIATION

Cornelius T. Gaffey and Victor J. Montoya *In its* Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 123 (See N69-33527 19-04)

Avail: CFSTI CSCL 06R

The utricle's stereoscopic sensitivity to irradiation was tested in the frog, Rana pipiens. Alpha particles (910 MeV) and deuterons (455 MeV) generated by the 184 inch cyclotron were used in whole body irradiations. Protons (48 MeV) accelerated by the 88 inch cyclotron were employed in localized hindbrain irradiations. Previous studies on frogs' isolated sciatic nerve demonstrated that 300 krad of 910 MeV lpha particles immediately block conduction of the nerve impulse. It was found that 18 to 22 krad (whole body) of 910 MeV lpha particles immediately removed the frog's righting reflex response. A desensitization and gradual loss of reflex ability followed 15 to 18 krad. With 10 to 15 krads there was a reduced level of reflex activity indicated by a protracted latency period. However, these lower doses did not eliminate the righting reflex. The effect of whole body irradiation with 455 MeV deuterons gave changes comparable to those induced by 910 MeV α particles. High energy proton hindbrain irradiation seems to produce a loss of the righting reflex at 20 krad, but unlike whole body irradiation this discrete head irradiation requires a postirradiation interval to manifest its destructive effect. K.R.G.

N69-33544*# California Univ., Berkeley. Lawrence Radiation Lab. THE VESTIBULAR APPARATUS AS INFLUENCED BY LOCALIZED HIGH-ENERGY IRRADIATION

Cornelius T. Gaffey and Victor J. Montoya In its Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 125 (See N69-33527 19-04)

Avail: CFSTI CSCL 06R

The vestibular apparatus of adult male cats was locally irradiated by 910 MeV α particles generated by the 184 inch cyclotron. Irradiation was restricted to a 1/4-inch diameter alpha beam. The α particle beam was used to irradiate one and then the other vestibular apparatus. Three reflexes were tested to evaluate the radiosensitivity of the vestibular apparatus: (1) the labyrinthine righting reflex (an otolith function), (2) the static head reflex (an otolith function), and (3) vestibular placing reflex (a semicircular canal linear acceleration function).

N69-33545*# California Univ., Berkeley. Lawrence Radiation Lab.
BRAIN IMPEDANCE STUDIES AND THEIR RELATION TO
RADIATION EFFECTS IN SPACE FLIGHT

Richard L. Schoenbrun In its Joint NASA-AEC Program in Space Radiation Biol. Sep. 1967 p 127-136 refs (See N69-33527 19-04)

Avail: CFSTI CSCL 06R

A technique for measurement of electrical impedance changes in small volumes of cerebral tissue by use of implanted electrodes was used to study the effects of high-energy particle irradiation on the functional integrity of the central nervous system in the cat. Results revealed tissue conductance changes in response to focal brain irradiation with 910 MeV helium nuclei at dose levels in excess of 10 krad. Immediately following exposure, as soon as recordings could be made (within 30 min), the resistance decreased and the capacitance increased at the site of exposure. Impedance was unchanged at recording sites outside the radiation field. Values returned to the baseline levels until Day 4, when resistance sharply increased and capacitance decreased. This situation remained to time of sacrifice at Day 10. Brain-wave activity recorded from the same electrodes was highly abnormal at the radiation site; there appeared, shortly after exposure, epileptiform seizure bursts and high amplitude spikes.

N69-33599# Joint Publications Research Service, Washington, D.C.

MODELING IN BIOLOGY AND MEDICINE

21 Jul. 1969 53 p refs Transl. into ENGLISH from Modelirovaniye v Biol. i Med. (Kiev), no. 3, 1968 p 31 –206 (JPRS-48455) Avail: CFSTI

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N69-33600# Joint Publications Research Service, Washington, D.C.

MATHEMATICAL MODEL OF PURPOSEFUL BEHAVIOR

S. Ya. Zaslavskiy and Z. L. Leybenzon *In its* Modeling in Biol. and Med. 21 Jul. 1969 p 1~9 refs (See N69-33599 19-04) Avail: CFSTI

Mathematical models are used to develop and investigate the decision making process in human behavior. Of the several methods available for use, the problem was investigated within the confines of a specific problem situation. The set theory and transition processes were used as aids in solving the problem.

N69-33601# Joint Publications Research Service, Washington, D.C.

CORRECT PERCEPTION OF SPEECH INVESTIGATED

J. M. Kreyn In its Modeling in Biol. and Med. 21 Jul. 1969
 p. 10 – 16 refs (See N69-33599 19-04)

Experimental results demonstrate that the same acoustic stimuli is perceived differently depending on whether they are component parts of speech signals or are in a non-speech category. Consonants are said to be a characteristic of speech perception

while vowels enter the non-speech category. Cited are differences in the aural perception depending on which ear, left or right, the signals enter or are delivered. Results show the right ear as more sensitive in speech material while the opposite is true for melodies and acoustic signals.

N69-33602# Joint Publications Research Service, Washington, D.C.

CORRELATION AND SPECTRUM ANALYSIS OF BRAIN BIOELECTRICS

M. A. Kulikov and S. P. Khozyainova *In its* Modeling in Biol. and Med. 21 Jul. 1969 p 17 – 24 refs (See N69-33599 19-04) Avail: CFSTI

An input device has made it possible to detect bioelectric activity of the brain. Programs were developed for the device so impulse frequency graphs, histograms of distribution on interimpulse intervals, and histograms of postimpulse probability could be compared. The algorithms of these programs are described. Digital computers were also used in bioelectric brain activity detection.

N69-33603# Joint Publications Research Service, Washington, D.C.

ORGANIZATION AND OPTIMALITY IN BIOSYSTEMS

Yu. G. Antonomov *In its* Modeling in Biol. and Med. 21 Jul. 1969 p 25 –42 refs (See N69-33599 19-04) Avail: CFSTI

An attempt to apply the concept of organization to the biosystem and indicate the possible optimality of its operation in instructional processes is examined. No adequate models are available to describe the process and attempts to apply existing ones failed. Reasons seem to indicate that no adequate model for independent variables can be made.

E. H.W.

N69-33617# Technische Hochschule Munchen (West Germany). STUDY OF THE FACTORS AFFECTING THE WEIGHT OF SUCKLING PIGS DURING THE WEANING PERIOD [UNTERSUCHUNG UEBER DIE ABHAENGIGKEIT DER FERKELGEWICHTE IM VERLAUFE DER SAEUGEPEROIDE] Philipp Saffer (Ph.D. Thesis) 1969 86 p refs In GERMAN Avail: CFSTI

Postnatal development of piglets and economical swine production are statistically evaluated by using least square and multiple variance methods to analyze the factors that determine birth and suckling period weights. Results show that litters of 10 to 18 piglets differ little in their median weights after a 35 day period. However, the birth weight of an individual piglet has a marked effect on its weight after weaning. Optimal keeping and feeding conditions can improve overall swine production.

Transl. by G.G.

 ${f N69\text{-}33710\#}$ Joint Publications Research Service, Washington, D.C.

HEMODYNAMIC CHANGES IN INDIVIDUALS WORKING UNDER MICROWAVE IRRADIATION

P. N. Fofanov et al 24 Jul. 1969 5 p ref Transl. into ENGLISH from Kardiologia (Moscow), v. 9, no. 4, 1969 p 124 – 126 (JPRS-48481) Avail: CFSTI

The changes in the main indices of human hemodynamics under the influence of microwave irradiation are studied in a clinical survey of subjects whose jobs exposed them to ultrahigh frequency electromagnetic radiation from a few years to more than 10 years. It is concluded that individuals exposed to ultrahigh frequency irradiation have a tendency toward bradycardia and moderate decrease in stroke and volume of the heart. F.O.S.

N69-33730# Royal Aircraft Establishment, Farnborough (England).
THE STIMULUS PARAMETERS OF VESTIBULAR CORIOLIS
EFFECTS [DIE REIZPARAMETER DES VESTIBULAREN
CORIOLIS-EFFEKTES]

H. Bornschein and G. Schubert May 1969 14 p refs Transl. into ENGLISH from Zschr. fur Biologie (Germany), v. 110, no. 4, Nov. 1958 p 269–275

(RAE-LIB-Trans-1349) Avail: CFSTI

Coriolis-accelerations occur in the system of the semicircular canals under the influence of two rotary movements rotating around a different axis. The stimulating effect depends upon the speed of the two rotations and upon the duration of the simultaneous action. The influence of the three stimulus-parameters mentioned has been tested on guinea-pigs by electronystagmographic experiments. The results are in agreement with the theory developed on the basis of the mechanical properties of the system of semicircular canals.

N69-33732# Royal Aircraft Establishment, Farnborough (England).
SOME INVESTIGATIONS INTO THE EFFECTS OF
SCOPOLAMINE ON MAN AFTER INGESTION AND AFTER
SUBCUTANEOUS INJECTION [NOGLE UNDERSOGELSER
OVER SCOPOLAMINS VIRKNINGER PAA MENNESKER
VED PERORAL OG SUBCUTAN INDGIFT]

Poul Christiansen May 1969 11 p refs Transl. into ENGLISH from Nord. Med. (Norway), v. 28, no. 4, 1945 p 2372–2374 (RAE-Lib-Trans-1343) Avail: CFSTI

The effects of hyoscine hydrobromide in single doses, given by mouth (3 mg) or by subcutaneous injection (0.5 mg) in a group of 8 subjects are studied. Measurements were made of pupil size, reaction to light and accommodation, salivary flow, pulse rate, respiration, blood pressure, muscle power, skin colour, sweat secretion, rectal temperature and mental effect. A dose of 0.5 mg subcutaneously appeared to be more powerful in its effects than 3 mg given by mouth.

N69-33761*# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.

PLANETARY QUARANTINE PROGRAM Quarterly Progress Report for Period Ending 30 Jun. 1969

30 Jun. 1969 42 p refs Supported in part by AEC (NASA Order R-09-019-040; NASA Order W-12853) (NASA-CR-103823; QR-13) Avail: CFSTI CSCL 05E

A planetary quarantine computer system for lunar programs was rendered in a reduced version, porgrammed, and checked out. Work on a kinetic death sterilization model for spore heat inactivation is described. Another model study dealt with the quantification of qualitative microbial sampling. Procedures, materials, and a microscopic particle counter were examined for use in bioburden experiments and modeling. In a thermo-radiation sterilization study, the complementary effects of simultaneous gamma radiation and heat were determined on various spores and on Streptococcus feacium. An estimate was completed of the transfer of microorganisms from the surface of the Apollo spacecraft-lunar module adaptor to the lunar module during launch.

N69-33775*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CLEAN ROOM TECHNOLOGY

James W. Useller Washington 1969 66 p refs (NASA-SP-5074) Avail: SOD \$0.35; CFSTI CSCL 06L

The clean room requirements are studied to control contamination for component reliability in industry and the space program. Contaminants are classified in four general categories: (1) particulate: dust, chips, fibers, etc.; (2) chemical: gases, liquids, oily films, etc.; (3) biological: bacteria, virus, fungi, spores, etc.; and (4) energy or changes of state. The controlling factors for clean rooms are facility design, equipment, procedures, activities, and maintenance. The operation and monitoring procedures are discussed.

N69-33780# Library of Congress, Washington, D.C. Aerospace Technology Div.

MICROBIAL DEGRADATION OF MATERIALS Surveys of Foreign Scientific and Technical Literature

Lee Perkins May 1969 32 p

(AD-687858; ATD-69-41) Avail: CFSTI CSCL 6/6

This compilation of abstracts, obtained from recent Soviet scientific and technical publications, is intended to provide information on Soviet research in biodegradation. The literature search was for articles on the preventive measures taken against microbial degradation of equipment and materials, especially wood, paper, cork, leather, glass, textiles, plant fibers, food, oils (vegetable or animal), adhesives, electronic equipment, or any synthetic substitutes of the above.

Author (TAB)

N69-33813# Texas Christian Univ., Fort Worth.
PARAMETERS OF HUMAN PATTERN PERCEPTION
Semiannual Progress Report, 18 Sep. 1968 – 18 Mar. 1969
Selby H. Evans 18 Apr. 1969 32 p refs
(Contract DAAD05-68-C-0176)

(AD-687380; SAPR-3) Avail: CFSTI CSCL 5/10

This report is the third six months progress report on a research program titled Parameters of Human Pattern Perception, supported under Project THEMIS. The completion of the initial (methodological) phase of the program is reported; developments in this phase include the achievement of a capability for obtaining quantitative measures on patterns and the completion of research supporting the use and selection of a graded response for pattern identification. Empirical efforts are reported, these being directed primarily at providing a basic understanding of what features people use in pattern recognition tasks and how they use these features. The principal conclusion from these studies is that humans detect and make use of the statistical distributions of features within a set of patterns as a basis for selecting a useful set of features. Theoretical developments relating to computer simulation of human performance in a pattern recognition task are also Author (TAB)

N69-33816# Royal Aircraft Establishment, Farnborough (England).
VARIATIONS OF UROPERSINOGEN IN THE FATIGUE
SYNDROME. DEVELOPMENT OF THE METHOD OF
ANALYSIS [VARIAZIONI DELL'UROPEPSINOGENO NELLA
'SINDROME DA AFFATICAMENTO]

C. Mellino et al Mar. 1969 21 p refs Transl. into ENGLISH from Nuovi Ann. Igiene Microbiol. (Rome), v. 17, no. 1, Feb. 1966 p 31–41

(RAE-Lib-Trans-1333) Avail: CFSTI

To study the changes in the quantity of uropepsinogen emitted daily in subjects working in several installations of the Italian Railway Administration in the frame of the research plan aiming at studying the state of nervous fatigue, an analytical technique by writing in detail the modifications which were made to such a technique, with a view to simplifying its execution was set up. The values obtained in 500 subjects aged between 30–50 years in microgrammes of tyrosine emitted by the enzyme in 100 ml of urine are reported. The data which present the greatest frequency oscillate around the arithmetic average of 62.60 with its relative sigma of ± 6.40 .

N69-33837# General Dynamics Corp., Groton, Conn. Electric Boat Div.

EXPERIMENTAL INVESTIGATIONS OF MAN-MACHINE PROCESSING OF INFORMATION, VOLUME 3 Annual Report, Jul. 1967 – Jul. 1968

Taylor L. Booth, Herbert M. Kaufman, Jerry Lamb, Robert M. Levy, and Russell A. Reiss Oct. 1968 153 p refs (Contract Nonr-2512(00))

F.O.S.

(AD-684838; U417-68-098) Avail: CFSTI CSCL 17/1

The aim of this project is to provide basic knowledge of the methods which may be used by a man-computer system to detect the presence of a target, using data from a passive sonar receiver. This research consists of analytical studies to evaluate important system parameters and experimental investigations measuring operator performance under various operating conditions. The first two reports in this volume describe the effects of pattern variations on human pattern recognition. The results measured the operators ability to visually detect patterns differing in shape and to detect patterns generated by statistically dependent sequences. The second two reports deal with basic human information processing and describe the testing of a predictive model for reaction time to visual stimuli and a test of the effects of number of stimuli on memory span.

Author (TAB)

N69-33864*# Public Health Service, Phoenix, Ariz. National Communicable Disease Center.

SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS

Martin S. Favero Jul. 1969 16 p (NASA Order R-137)

(NASA-CR-103791; Rept-26) Avail: CFSTI CSCL 06C

Spores were isolated from space vehicles and tested by a replicate unit system, and the growth progress was reported after two weeks at 32 °C. The D_{125C} values were calculated from fractional replicate-unit-negative data using the most probable number technique. Comparisons between this method and the colony count method show no marked differences between the two methods. A third test based on the slope of best fit lines through survivor points show large inconsistencies with the other tests. Attempts are being made to resolve the variations.

 ${f N69-33919\#}$ National Physical Lab., Teddington (England). Aerodynamics Div.

THE RELATIONSHIPS BETWEEN HEARING LOSS AND NOISE EXPOSURE

D. W. Robinson Jul. 1968 58 p refs (NPL-AERO-Ac-32) Avail: CFSTI

Measured hearing levels of 759 industrial noise-exposed and of 97 non-exposed control subjects, together with detailed noise measurements and exposure histories of the exposed group, are examined by statistical methods. Subjects were closely screened to exclude cases of hearing impairment other than due to noise and age, the selection criteria being more rigorous than in many other studies. A concise mathematical relationship between the variables is derived, and a nomogram is given for estimating hearing-damage risk in terms of the percentage of people whose noise-induced hearing loss may be expected to exceed any specified audiometric value. The effect of age is allowed for by means of a uniform correction. A random incidence study would in general show greater hearing losses due to causes eliminated from this investigation. The noise exposures ranged from 75 to 120 dB(A) and from 1 month to 50 years. The shape of the noise-induced component of the audiogram is shown to be independent of the frequency-spectrum of the noise over a wide range of industrially-occurring examples. Author (ESRO

N69-33932# Flying Personnel Research Committee, London (England).

A PERSONAL TORSO PARACHUTE HARNESS AND A MODIFIED RESTRAINT HARNESS FOR THE TYPE 9 EJECTION SEAT

D. G. Beeton, R. Harrison, J. H. Lemon, A. T. Prescott, C. Reader et al Dec. 1968 34 p refs (FPRC/Memo-244) Avail: CFSTI

A personal torso parachute harness and a modified restraint harness have been evaluated and compared with the parachute and restraint harness proposed for the Martin Baker type 9 ejection seat. Experiments involving high vertical and forward accelerations have shown that the personal torso harness and the modified restraint harness are suitable alternatives to the proposed assembly and avoid the risk of restriction of the control column movement and fouling of the lap strap/pilot's equipment connector, in the Harrier aircraft. Recommendations are made to improve the inadequate shoulder restraint of the type 9 ejection seat. Author

N69-33934# Royal Aircraft Establishment, Farnborough (England).
INFLUENCE OF SOLAR-HEAT LOAD ON MAN [CIEPLNY WPLYW PROMIENIOWANIA SLONECZNEGO NA CZLOWIEKA]

M. Gregorczuk Mar. 1969 16 p refs Transl. into ENGLISH from Przegl. Geofiz. (Poland), no. 2, 1966 p 119 – 128 (RAE-Lib-Trans-1359) Avail: CFSTI

Some of the thermal effects of sunlight and radiant temperature on man are investigated. Nomograms are presented for calculation of the increase of air temperature equivalent to the solar heat load on man. On the basis of a nomogram for calculation of effective temperature radiation, the influence of radiation on formation of this biometeorological temperature is analyzed.

Author

N69-33975*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF MAGNETIC FIELDS UPON BIOLOGICAL SYSTEMS

C. C. Conley, P. W. Droll, W. J. Mills, and Patricia A. Corsaut *In* Nev. Univ. Space Magnetic Exploration and Technol. 1967 p 339 – 349 refs (See N69-33951 19-23)

Avail: CFSTI CSCL 06S

A space magnetic environment simulation facility was used to observe the effects of both nulled and high magnetic fields on the activities of acid phosphatase, and of two other enzymes, in vitro. Results showed the lack of any significant effects by either the high or the low magnetic fields upon all enzyme activities. A biological enzyme content assay on mice cells, placed within the nulled area of the activated coils during the incubation period, markedly reduced cellular enzyme responses to inoculation of a foreign bipolymer, in vivo.

N69-33986# Tufts Univ., Medford, Mass. Neuropsychology Lab. HUMAN SPATIALLY ORIENTED BEHAVIOR Final Scientific Report, 15 Oct. 1967 – 14 Apr. 1969

Sanford J. Freedman Apr. 1969 8 p refs (Grant AF-AFOSR-1362-68)

(AD-687847; AFOSR-69-0576TR) Avail: CFSTI CSCL 5/10

Studies of the disruption and relearning of sensorimotor relationships were completed and a theoretical position formulated: (1) Transformations created by perceptual rearrangement and disarrangement experiments change relationships between two or more kinds of spatial information which are normally congruent or concordant. (2) To execute accurate spatially oriented behavior under transformed conditions, the observer must solve the problem of defining the transformation: (a) an adequate amount of relevant information must be available to him and he must be able to assimilate it; (b) information may be supplied through any sensory channel or combination or may derive from memory or cognition; (c) he may be unsuccessful or only partially successful. (3) The problem is solved by inserting into the sensorimotor system a constant which compensates for the experimental transformation. This approach is generally applicable and confers the power of prediction and control whereas other theories which have been proposed do not meet these tests. Author (TAB)

N69-34033# Royal Aircraft Establishment, Farnborough (England). ON THE PREVENTION OF AIR-SICKNESS IN PILOTS [SULLA PREVENZIONE DEL MAL D'ARIA NEI PILOTI]

C. Borghesan et al Mar. 1969 28 p refs Transl. into ENGLISH from Riv. Med. Aeron. Spaziale (Rome), no. 29, Dec. 1966 p 374 – 397

(RAE-Lib-Trans-1348) Avail: CFSTI

The most recent literature on air-sickness pathogenesis is surveyed to arrive at an understanding of the therapeutic utility and efficiency of some drugs, used at present. The results of some tests, (now in use or under study) to be used in screening of non-fit flight individuals because of their predisposition to air-sickness are also examined. This study was carried out to show aviation medicine specialists the methods presently available to prevent a relatively large number of applicant pilots from being disqualified in their advanced flight training. The importance of vestibular proprioceptors was pointed out. The reticular system, at present considered the most important control apparatus of the central nervous system, as well as the conduction and integration center of all sensorial stimuli, was indicated as a pathogenic mechanism center of motion sickness. The results of the treatment with some drugs, as well as of some laboratory methods at present used in the prevention of air-sickness in pilots are also discussed.

N69-34044# Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.

EFFECT OF RAPID EYE MOVEMENT (DREAMING) SLEEP DEPRIVATION ON RETENTION OF AVOIDANCE LEARNING IN RATS

Chester A. Pearlman Feb. 1969 10 p refs Presented at the Ann. Meeting of the Assoc. for the Psycho-Physiol. Study of Sleep, Denver, 24 Mar. 1968

(AD-687691; SMRL-563) Avail: CFSTI CSCL 5/10

The effect of deprivation of rapid eye movement (REM) sleep upon retention of a passive avoidance response in rats was studied. An incompletely-learned avoidance response was established in one trial by shocking the animals when they stepped down from an elevated platform. Fourteen animals were then deprived of REM sleep by placing them on small inverted pots in a pool of water. Twelve control animals were placed on slightly larger pots which permitted normal sleep. None of the REM-Deprived animals showed retention of the response when tested the day after training, whereas sixty per cent of the control animals showed retention. The results suggested that REM sleep is essential for adequate adaptation to new experiences, especially those which cannot be completely comprehended upon first exposure.

N69-34053# Aerospace Medical Research Labs., Wright-Patterson AFB. Ohio.

AN AUTOMATIC ANALOG BREATHING SYSTEM FOR MULTICELL PRESSURE SUITS Final Report

Otto Schueller Mar. 1969 21 p refs

(AD-687436; AMRL-TR-67-235) Avail: CFSTI CSCL 6/17

The design criteria for an oxygen regulator for multicell pressure suits, such as the Boyles Law Suit, are analyzed. On the latest models of the Boyles Law Suit the conventional breathing bladder in the thorax area was omitted to reduce vulnerability and fire hazard. The volume changes of the body during breathing are compensated by equivalent volume changes of the gas in the closed cells of the suit. If a conventional oxygen regulator is used, the wearer must work to compress the gas in the closed cells. An oxygen regulator is proposed that uses the energy stored in compressed oxygen to do the necessary compression work on the gas in the closed cells of the suit, and to relieve the wearer from fatiguing breathing effort. A pressure sensor in the chest area or

the slight pressure fluctuations during breathing can be used to produce simultaneous breathing pressure changes equivalent or approximate to the gas pressure changes in the closed cells or tubes of the suit. This type of regulator also permits considerable reduction of the cell volume and bulk of the suit.

Author (TAB)

N69-34073# Western Australia Univ., Nedlands. Dept. of Psychology.

A SYSTEMATIC INVESTIGATION OF CONTRAST EFFECTS AND SIMILAR PHENOMENA RELATED TO VIGILANCE TASKS Final Technical Report

Vincent Di Lollo Mar. 1969 11 p refs (Grant AF-AFOSR-968-67)

(AD-687446; AFOSR-69-1215TR) Avail: CFSTI CSCL 5 /10

The report is a summary of research in four major areas: Contrast effects in psychophysical judgment; Contrast effects in the single runway; Frustration effect in the double runway; and Appetitive classical conditioning of the rabbits jaw movement. The results obtained in each area are presented with reference to detailed reports submitted during the period of investigation.

N69-34082# Commissariat a l'Energie Atomique, Fontenayaux-Roses (France). Centre d'Etudes Nucleaires.

BIBLIOGRAPHIC DISCUSSION ON THE

PHYSICO-CHEMICAL BEHAVIOR AND THE RADIOECOLOGY IN HYDROBIOLOGICAL SYSTEMS OF CERIUM AND OTHER

LANTHANIDES [DISCUSSION BIBLIOGRAPHIQUE SUR LE COMPORTEMENT PHYSICO-CHIMIQUE ET LA RADIOECOLOGIE DANS LES SYSTEMES HYDROBIOLOGIQUES DU CERIUM ET DE QUELQUES

HYDROBIOLOGIQUES DU CERIUM ET DE QUELQUES Autres Lanthanides]

Robert Bittel May 1969 30 p refs In FRENCH; ENGLISH summary

(Contract EURATOM-PSAF-003-63-10)

(CEA-BIB-138; EUR-4107-f) Avail: CFSTI

This report forms part of the studies on the behavior of radionuclides characterized by a complex physico-chemistry and whose destiny in hydrobiological systems varies according to the combinations in which they are included. The first part is dedicated to the physico-chemical aspects and the main characteristics of rare earths are examined. Emphasis was given to the lanthanides, certain isotopes of which are fission products with long or medium half-lives, and more particularly to cerium, prometheum and europium. The complexes of these elements with different mineral or organic compounds, present in effluents and contaminated aqueous environment, have been examined with special regard to compounds of biochemical importance. Special attention has been given to the analytical techniques used in tracer chemistry and radiochemistry. The second part is dedicated to the behavior of rare earths, principally cerium in water and soils which depend at the same time on the physico-chemical nature of the radioelement and on the environmental conditions. For the rare earths as for ruthenium and cobalt, it seems desirable to substitute the idea of the radioecology of a physico-chemical combination to that of the Author (ESRO) radioecology of a radionuclide.

N69-34150# United Kingdom Atomic Energy Authority, Harwell (England).

UK MEASUREMENTS AT THE 5TH INTERNATIONAL INTERCOMPARISON OF NUCLEAR ACCIDENT DOSIMETRY SYSTEMS, ORNL, JULY 1968

N. Adams and J. A. Dennis Jan. 1969 35 p refs (AERE-R-6008) Avail: CFSTI

In a series of exposures to mixed neutron and gamma fields produced by the Health Physics Research Reactor at ORNL,

teams from several countries compared their systems for assessing doses in criticality accidents. The measurements made by the Harwell team, both in free-air and on phantoms, with A.E.R.E. criticality dosimeters and a threshold detector system are given. These measurements are compared with those made by the other teams. The sodium activation in 18 cm diameter cylindrical phantoms was found to be very nearly the same as in man-like phantoms. The use of such phantoms in installed dosimetry systems is recommended. Conceptual inadequacies of the assessment of intermediate-energy neutron doses from threshold detector systems are briefly discussed, and more work on this problem is recommended.

N69-34204# Commissariat l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucléaires.

THE RADIOSENSITIVITY OF THE SWISS-RAP MOUSE AS A FUNCTION OF ITS GROWTH RATE [RADIOSENSIBILITE DE LA SOUCHE DE SOURIS SWISS-RAP EN FONCTION DE SON TAUX DE CROISSANCE]

Gérard Legeay and Jean-Francois Glas Apr. 1969 19 p refs In FRENCH; ENGLISH summary

(CEA-R-3797) Avail: CFSTI

The results of an exhaustive study of the age-dependence of the radiosensitivity of female Swiss-Rap mice are given. A close relationship between radiosensitivity and age was not apparent, whereas the weekly growth rate could be accurately related to radiosensitivity. Thus the latter quantity should be studied when a strain is to be used for biological experiments. Author (ESRO)

N69-34221# Sharpley Labs., Inc., Fredericksburg, Va. DETECTION OF MICROBIAL CONTAMINANTS IN SPACE SYSTEM WATER SUPPLIES Final Report, Apr. 1967-Jun. 1968

J. Miles Sharpley Wright-Patterson AFB, Ohio AMRL Dec. 1968 71 p refs

(Contract F33615-67-C-1597)

(AD-687853; AMRL-TR-68-67) Avail: CFSTI CSCL 13/2

The feasibility of detecting microorganisms in water by using declining flow rates through a membrane filter has been determined. Results obtained indicate that microorganisms in water may be detected by the decrease in flow rates through a sub-micron filter used under standard conditions. Decreases in flow rates shown by bacteria are appreciably greater than those caused by inert materials. Results from this study indicate that differential filtration rates may be used as a device for the physical detection of microorganisms in potable water in space system water supplies. Author (TAB)

N69-34225# Army Foreign Science and Technology Center, Washington, D.C.

MAN IN SPACE. SCIENTIFIC POPULAR MEDICAL LITERATURE

A. M. Genin et al Apr. 1969 102 p refs Transl. into ENGLISH of the book "Chelovek v Kosmose" USSR, 1967 p 1-159 (AD-687760; FSTC-HT-23-900-68) Avail: CFSTI CSCL 6/19

The booklet introduces certain information concerned with the preparation and realization of manned space flights on board the Vostok spacecraft. The work is designed for a wide range of Author (TAB) readers.

N69-34243# Texas Univ., Houston. Graduate School of Biomedical Sciences

THE EFFECTS OF LASER RADIATION ON RECEPTOR **FUNCTION IN HUMAN AND PRIMATE EYES**

H. G. Sperling, R. S. Harwerth, J. H. Mabry, and D. J. Landis Apr. 1969 26 p refs

(Contract DADA17-67-C-7154)

(AD-688626; UT-GSBS-DADA-2) Avail: CFSTI CSCL 6/5

In a series of experiments, the effects of intense spectral bands having the characteristics of ruby and argon laser light have been measured in rhesus monkey eyes. Results obtained by measuring spectral sensitivity in their presence - or immediately after these exposures - demand a two-stage (receptor stage, neural opponent stage) explanation of spectral sensitivity for the highly light adapted eye. In continuing studies, these measures are being carried over the entire range up to intensities of laser light which will produce gross thermal injury. It is planned to relate changes in visual sensitivity to ultrastructural changes in the retina. Techniques for ultrastructural study of the vertebrate retina are briefly discussed.

N69-34245*# TRW Systems, Cleveland, Ohio. Mechanical

LONG-TERM OPERATION OF A WATER ELECTROLYSIS MODULE

F. H. Schubert [1969] 25 p refs

(Contract NAS2-4444)

(NASA-CR-73355) Avail: CFSTI CSCL 06K

A water electrolysis module (WEM) designed to provide 3.6 pounds of oxygen per day at a current density of 100 amps/ft 2 and at a pressure level of 80 psia was developed. Although designed for aircraft application, the concepts employed in the design of the module make its use in other life support systems possible. One of the ten-cell water electrolysis modules fabricated, and designated as WEM #1, has been successfully operated for 7,525 hours. These hours consist of 300 hours of parametric, 180 hours of cyclic, and 7,045 hours of endurance testing, to date. The endurance test program is being conducted at a current density of 80 amps/ft2, a temperature of 175°F, and a pressure level of 30 psia. A description is given of the cell and module configurations and the materials of construction selected. Results of the parametric and cyclic test programs are presented and cell performance and servicing and maintenance requirements discussed.

N69-34250# School of Aerospace Medicine, Brooks AFB, Tex. BIOASTRONAUTICS AND THE EXPLORATION OF SPACE

Charles H. Roadman, Hubertus Strughold, Roland B. Michell, Jack Harmon, and Richard Schafer Nov. 1968 639 p refs Presented at the 4th Intern. Symp., San Antonio, Tex., 24–27 Jun. 1968 (AD-687893) Avail: CFSTI CSCL 6/3

Contents include: History and tribute to aerospace medical pioneers; On fundamental scientific advances resulting from the space program; Some remarks on the evolution of the atmospheres and the oceans; Chemical evolution and the origin of life; Physics of the universe; The Andean man; Supersonic and hypersonic flight; Life support (survival) in space; One-man propulsion devices and their application on earth and in space; Manned space stations; Bioastronautics and orbiting space stations; Orbital flight results; Geologic orbital photography: Conditions on the planet Venus; The sun; Empirical arguments concerning Diracs gravitational hypothesis; A strategic approach to interplanetary flight; The human eye in space exploration; Biodynamic environments in spaceflight; Nutrition for long space voyages; Space chemistry in the 1970s; Bionics; Planetary environmental medicine (Mars); Next--The Planets; Importance of the use of extraterrestrial resources to the economy of space flight beyond near-earth orbit; Problems in detection of extraterrestrial life; Extraterrestrial biology. TAB

N69-34299# Air Force Systems Command, Wright-Patterson AFB, Ohio. Human Resources Lab.

APPLICATIONS OF A SIMULATION ANALYZER PROGRAM FOR DERIVING AND EVALUATING NUMERICAL INTEGRATION TECHNIQUES Technical Report, Jan.-Aug. 1968

Patricia A. Knoop Mar. 1969 118 p refs (AD-687854; AFHRL-TR-68-9) Avail: CFSTI CSCL 5/9

The report describes applications of a Simulation Analyzer Program for deriving or evaluating numerical integration methods for use in flight simulation for training. The FORTRAN program was developed in an earlier study, and its theoretical bases and capabilities are briefly presented in this report. The program is used to derive and evaluate optimal integration methods for application to a selected first-order and a second-order differential system. The derived methods are used to solve these systems, and actual solution characteristics are compared with those predicted beforehand by the program. Characteristics of accuracy, actual percent error, stability, and error propagation are shown to be accurately predicted, as is the largest integration interval usable for each problem with each integration method. A thorough description is provided of the five popular simulation-integration techniques in use today and of a recommended procedure for using the Simulation Analyzer Program to derive new integration methods which allow maximization of the integration interval for specific simulation problems. As an example, the program is used to evaluate known methods and derive new methods for the F-100A problem using integration intervals of 0.05 and 0.10. A list of over 70 new integration methods derived by the program, including their stability and truncation-error characteristics, is provided. Author (TAR)

N69-34314*# West Virginia Univ., Morgantown. Dept. of Microbiology.

RELATIONSHIP OF OXYGEN TENSION TO VIRAL DISEASE Final Report

B. E. Kirk 2 Jun. 1969 14 p refs (Grant NGL-49-001-001)

(NASA-CR-103947) Avail: CFSTI CSCL 06M

Attempts are described to develop a tissue culture system useful for isolation and quantization of lymphocytic choriomeningitis virus. Using a number of different types of cell cultures, culture conditions were manipulated in attempts to induce a direct cytopathic effect by the virus which might be used as an index of infection. These attempts have been based on reports of other investigators regarding similar effects with the same or different viruses as well as leads obtained in experiments. Results obtained to date are presented according to the type of cell used; they include chick embryo cells, rabbit embryo cells, mouse embryo cells, monkey kidney cells, mouse peritoneal macrophages, and BHK-21 clone 13 cells. Concentrations, inhibitors, serums, and antigens were also studied.

N69-34393# Aerojet General Corp., Azusa, Calif. Electronics

CRYOGENIC SOLID OXYGEN STORAGE AND SUBLIMATION INVESTIGATION Final Report, 1 Jul. 1967–31 Mar. 1968

John E. Ahern and Truman W. Lawson, Jr. Wright-Patterson AFB, Ohio AMRL Aerospace Med. Res. Lab. 185 p refs (Contract F33615-67-C-1849)

(AD-687852; AGC-3545; AMRL-TR-68-105) Avail: CFSTI CSCL 6/11

The use of solid oxygen for storage and supply systems in space applications was studied both analytically and experimentally. The analysis indicated that the use of solid oxygen could provide substantially longer storage times over that obtainable with subcritical and supercritical oxygen. Oxygen transport from the vacuum storage condition of solid oxygen to a condition suitable for breathing was demonstrated experimentally by two methods, vapor transport using cryosorption pumps and solid transport by mechanically moving the solid through a vapor lock. A preliminary analysis of the transport methods indicates that the mechanical system should be the most suitable.

Author (TAB)

N69-34457# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
THE MEASUREMENT OF HUMAN PILOT DYNAMICS IN A
PURSUIT-PLUS-DISTURBANCE TRACKING TASK Interim
Report

L. D. Reid Apr. 1969 192 p refs (Grant AF-AFOSR-1490-68)

(AD-688505; UTIAS-138; AFOSR-69-1431TR) Avail: CFSTI CSCL 5 /10

The report gives a detailed description of the theory required to measure for human pilot performing compensatory and pursuit-plus-disturbance tracking tasks with continuous input spectra. A group of 8 subjects performed over 4000 individual tracking tasks in a period of 2 years as part of a program to investigate mathematical models of this task. The results of the study are presented as amplitude and phase plots of measured describing functions, (two describing functions are used to model the pursuit-plus-disturbance cases). Linear models were fitted to the measured data and used to determine quantitative trends among the tasks performed.

Author (TAB)

N69-34458# School of Aerospace Medicine, Brooks AFB, Tex. PHARMACOLOGY AND TOXICOLOGY OF PROPELLANT HYDRAZINES

Dale A. Clark, Jarrell D. Bairrington, Harold L. Bitter, Frederic L. Coe, and Miguel A. Medina Dec. 1968 131 p refs (AD-688500; SAM-REVIEW-11-68; SAM-TR-68-125) Avail: CFSTI CSCL 21/8.1

This review surveys the toxicology, metabolic effects, central nervous system effects, renal aspects, effects upon the fibrinolytic system and biologic membranes of the propellant hydrazines, hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine.

Author (TAB)

N69-34585# Joint Publications Research Service, Washington, D.C.

BIOMEDICAL RESEARCH CONDUCTED IN THE USSR DURING 1968 AND EARLY 1969 UNDER THE SPACE RESEARCH PROGRAM

V. V. Parin et al. 1 Aug. 1969 13 p. refs. Transl. into ENGLISH of the publ. "Mediko-Biologicheskiye Issledovaniya, Provedennyye v SSSR v Techeniye 1969 g. i Nachala 1969 po Programme Issledovaniya i Osvoyeniya Kosmicheskogo Prostranstva" Moscow, Izd. AN SSSR, 1969 p. 1–19

(JPRS-48534) Avail: CFSTI CSCL 06S

Validation of the admissible doses and the protection of spacecrews against exposure to ionizing radiation were studied by exposing dogs to gamma irradiation over a period of several years. The clinical results obtained during observations of the animals over the last two years of the experiment in hematology, biochemistry physiology, cytology, and immunology are given. The recommended doses for a 30 day space flight are: (1) admissible dose, 15 rem; (2) justifiable risk dose, 50 rem; and (3) critical dose, 125 rem. Daily diuresis of cosmonauts for pre- and postflight periods are tabulated.

N69-34607# Sandia Corp., Albuquerque, N. Mex. DESIGN REQUIREMENTS FOR LAMINAR AIRFLOW CLEAN ROOMS AND DEVICES

K. F. Lindell, W. J. Whitfield, and D. M. Garst May 1969 $\,$ 55 p refs Sponsored by AEC

(SC-M-69-129) Avail: CFSTI

The basic concept of laminar airflow and the control of airborne contamination by this method are explained. Basic design criteria essential for the maximum performance of the various types of laminar airflow facilities are described and illustrated. An appendix provides a list of items useful in preparing a comprehensive clean room specification.

Author (NSA)

N69-34647# Wissenschaftliche Gesellschaft für Luft- und Raumfahrt, Brunswick (West Germany).

PROCEEDINGS OF THE FIFTH WGLR MEETING ON HUMAN FACTORS ENGINEERING (BERICHT UEBER DIE 5. SITZUNG DES WGLR-FACHAUSSCHUSSES FUER ANTHROPOTECHNIK)

Feb. 1968 43 p refs In GERMAN Conf. held at Berlin, 9 Jan. 1967

(DLR-MITT-68-04) Avail: CFSTI

CONTENTS:

- 1. ELECTRONIC DISPLAY TECHNOLOGY AND ITS SIGNIFICANCE IN AIRCRAFT INSTRUMENTATION R. Beyer (Deutsche Forschungsanstalt für Luft- und Raumfahrt, Brunswick) p. 7–36 refs (See N69-34648 20-09)
- 2. PSYCHOPHYSIOLOGICAL INFLUENCES AND THEIR CONSIDERATION IN MEASUREMENTS IN MAN-MACHINE SYSTEMS H. Schmidtke (Tech. Hochschule Munchen, W. Ger.) p 37-45 (See N69-34649 20-05)

N69-34649# Technische Hochschule München (West Germany). Institut fuer Ergonomie.

PSYCHOPHYSIOLOGICAL INFLUENCES AND THEIR CONSIDERATION IN MEASUREMENTS IN MAN-MACHINE SYSTEMS [PSYCHOPHYSIOLOGISCHE EINFLUSSGROESSEN UND DEREN BERUECKSICHTIGUNG BEIDER MESSUNG IN MENSCH-MASCHINE-SYSTEMEN]

H. Schmidtke In WGLR Proc. of the 5th WGLR Meeting on Human Factors Eng. Feb. 1968 p 37-45 In GERMAN (See N69-34647 20-05)

Avail: CFSTI

The influence of several physiological and psychological factors on human performance in man-machine systems is discussed; in particular, motivation, sensory deprivation or overloading, vigilance, environmental conditions, as temperature, noise vibration, circadian rhythms, sleep deprivation and fatigue, well being, and visual acuity. The effects of each of these factors are described, and means for objectively determining the effects of these influences are discussed.

N69-34670*# Bellcomm, Inc., Washington, D.C. ON THE POSSIBILITY OF EXOTIC BIOCHEMISTRIES

S. G. Schulman 17 Dec. 1968 30 parefs (Contract NASw-417)

(NASA-CR-104095; TR-68-710-9) Avail: CFSTI CSCL 06A

The likelihood of abiogenesis and extraterrestrial life based upon chemical structures other than the usual proteins, nucleic acids, water and other organic molecules common to terrestrial biochemistry is examined. High cosmic abundance and small size are found to be desirable features of atoms comprising the large molecules of living systems. Polarity, abundance, and good solvating properties are found to be the requirements for a suitable biological solvent. It is concluded that hydrogen and the elements in the second row of the Periodic Table - namely carbon, nitrogen and oxygen, are necessary major components of biologically significant molecules, although some variation from the terrestrial biomolecules is possible under different pressure temperature and concentration conditions. Ammonia is found to be a possible replacement for water, as a biological solvent, under conditions where water is frozen but ammonia is a liquid. Author

N69-34711*# Illinois Univ., Urbana.

REGULATION OF THERMAL SWEATING IN EVA SPACE

John C. Chato and Bruce A. Hertig 14 Jul. 1969 19 p refs (Grant NGR-14-005-103)

(NASA-CR-104071) Avail: CFSTI CSCL 06K

Metabolic heat removal in extravehicular thermoregulation space suits was studied, with emphasis on the regulation of sweat rates and the disposition of secreted sweat. Tests were conducted with volunteer subjects, and it was found that uniform direct contact cooling of the skin failed to reduce sweat secretion to a minimal level of about 100 g/hr in case of some subjects. This suggests the necessity for including a sweat removal mechanism in all space suits unless (1) physiological tests determined that the astronaut's sweat rate does not require it, or (2) another method of metabolic heat removal can be found. Two such methods are discussed. The first involves suppression of the sweat rate by zone cooling, and the second, an opposite concept, made use of the astronaut's own thermoregulatory system. The second method employs cooling by sweat evaporation and uses porous sublimator plates for the removal of moisture.

N69-34728# Electrotechnical Lab., Tokyo (Japan). ANALYSIS OF THE EYE MOVEMENT SYSTEM

Noboru Sugie Nov. 1968 101 p refs In JAPANESE; ENGLISH summary Its Res. No. 693

Avail: CFSTI

Eye movement, induced solely by the visual input, is investigated using physiological and anatomical aspects. A theoretical attempt is made of predictive control of visual target tracking. Results agree reasonably well with predictions. Eye movement induced by head rotation, linear motion of the head, neck proprioceptive system and visual target tracking with active head movement are investigated. Results indicate eye movement is independent of other body movements and that movement is made up of a quick component for vision correction, and a slow component for velocity correction. Both humans and cats were used in the tests.

N69-34751# Advisory Group for Aerospace Research and Development, Paris (France).

PATTERN RECOGNITION. BODY ARMOUR AND AIRCREW EQUIPMENT ASSEMBLIES. CURRENT SPACE MEDICAL PROBLEMS. AEROMEDICAL EVACUATION

Oct. 1968 262 p refs Proc. of the 25th Meeting of the Aerospace Med. Panel of AGARD Held in London, 15–17 Oct. 1968 (AGARD-CP-41) Avail: CFSTI

Areas of operational, military, and medical interest are discussed in terms of pattern recognition, body armor and aircrew equipment assemblies, aerospace medical problems, and aeromedical evacuation. For individual titles, see N69-34752 through N69-34780.

N69-34752# Royal Aircraft Establishment, Farnborough (England). VISUAL THEORY IN TARGET ACQUISITION

E. 8. Davies In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 14 p refs (See N69-34751 20-04)

Avail: CFSTI

The theoretical approach to visual search for a target based on the target's contrast and size and the concept of visual-lobes is reviewed briefly. New flight data for foveal contrast size thresholds, related to the maximum detection ranges of prominent terrain objects, are found to compare favorably with laboratory data from much simpler visual tasks. Two laboratory search experiments analyzed in terms of visual theory are shown to agree well with it, with little modification of the data used in the theory from certain selected but otherwise standard data. In particular, glimpse times of the order 1/3 to 2/3 seconds are found to be quite adequate to describe the experimental results.

N69-34753# Nottingham Univ. (England). Dept. of Psychology. TOWARDS A THEORY OF VISUAL SEARCH

C. I. Howarth and J. R. Bloomfield In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 14 p refs (See N69-34751 20-04)

Avail: CFSTI

As part of a larger research project into the nature of visual search, a simple, adaptable search task, in which subjects look for the odd disc in a display of larger or smaller discs, was devised. Extensive studies of well practiced observers, producing much basic search data, were carried out. A model was also constructed from basic search theory which is not definitive, but is mathematically simple, and, to some extent, accounts for the data found experimentally. However, there are some problems, and this is no more than a first step in a continuing effort to devise ways of predicting the range and latency of real targets from a physical specification of the target-background complex.

N69-34754# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Aerosace Medical Div.

VARIABLES UNDERLYING THE RECOGNITION OF RANDOM SHAPES

Herbert J. Clark and Ronald L. Knoll (Antioch Coll.) In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies, Current Space Med. Probl. Aeromed, Evacuation Oct. 1968 11 p refs (See N69-34751 20-04)

Previous studies showed that shape association value (percentage of subjects making an association to a shape) is a strong determining factor in shape recognition. In this study, the physical characteristics of shapes of high and low association value were compared. The intent was to uncover general physical characteristics of shape which differentiate shapes of high association value from shapes of low association value, and, thus, shapes accurately recognized from those not so accurately recognized. Comparisons were made on the basis of 12 factor scores per shape derived from an extensive analysis of 22 physical measures of shape. Results were that none of the factors differentiated between the two classes of shapes. Conclusions were that the physical measures may have been insensitive to perceptually conspicuous features in the perimeters of the shapes, and that associations to a shape are probably too varied in content to expect a few general physical measures to underlie those varied associations. Author

N69-34755# Aerospace Medicine Center, Rome (Italy). PERCEPTION AND IDENTIFICATION OF SIMPLE IMAGES, PRESENTED IN DIFFERENT SEQUENCES, BY SUBJECTS SUBMITTED TO VARIOUS GRAVITATIONAL FIELDS

A. Scano, G. Meineri, and R. Caporale In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 11 p refs (See N69-34751 20-04)

Eleven normal, emmetropic subjects, known to be reliable, were used. While fixing the center of a perimeter with one eye, the subjects had to try to identify simple illuminated images, or at least to indicate the appearance of light. These simple images were located at 8°, 24°, 40°, 56° and 72° from the center, both on the right and left sides, and were illuminated for a brief time either in regular succession or random order. The subjects submitted to gravitational fields of +1Gz, +1.8Gz and +2.4Gz did not show any appreciable change in their undefined perception power or in their identification power of extra-foveal images, presented both in regular and random successions, as a consequence of different field intensity. The perception area of an undefined luminous message was distributed according to the well known shape of the monocular visual field. On the other hand, the area within which simple black and white images were identified was almost circular in shape and covered a surface which had a radius of about 20° centered on the fixation point. The method used demonstrated only a slight difference between the results obtained when the images in the visual field were presented in a regular or random sequence. Author

N69-34759# Aerospace Medical Research Labs., Wright-Patterson

RESEARCH FINDINGS ON TARGET DETECTION THAT HAVE IMPLICATIONS FOR PATTERN RECOGNITION

Herschel C. Self In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 6 p refs (See N69-34751 20-04)

(AMRL-TR-68-156) Avail: CFSTI

The target-finding behavior of observers was examined using a variety of sensors and displays with static and moving scenes. Some of the numerous findings having implications for pattern recognition are discussed. It is pointed out that the detection-recognition dichotomy may be misleading: (1) that, within wide limits, contrast may influence reaction time more than it does probability of detection; (2) that either context or briefing may relegate resolution and contrast to minor roles; (3) that target finding is complicated by target-background interaction; and (4) that likely target locations reduce image quality requirements, while unlikely ones increase them. It follows that a priori search patterns can be inefficient, and that detection or recognition prediction models must be very complex to be useful. Finally, the antagonistic demands upon observer behavior of different performance goals are discussed.

N69-34761# Army Board for Aviation Accident Research, Fort Rucker, Ala.

SAFETY IMPLICATIONS OF AIRCREW ARMOR AND **ALLIED PERSONAL EQUIPMENT**

Kelly G. Gregory In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed, Evacuation, Oct. 1968, 5, p. (See N69-34751, 20-04). Avail: CESTI

Various items of aircrew armor are described. Safety implications and misadventures that have occurred in their use are noted. Suggestions are given for prevention of such occurrences. Author

N69-34762# Air Force Systems Command, Brooks AFB, Tex. Aerospace Medical Div.

A NEW AIRCREW ARMOR VEST DEVELOPED FOR PROTECTION OF THE NECK AND OTHER PERIPHERAL REGIONS

John E. Murphy, Bruce H. Warren, and Edward R. Barron In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 13 p refs (See N69-34751 20-04) Avail: CFSTI

The aircrew aq'mor was developed as a rapid response to a combat problem where UC-123 aircraft flying low level missions were sustaining small arms hits. Aircrewmen in these aircraft were receiving wounds from secondary missiles produced from the aircraft's plastic canopy and aluminum skin. Although they were wearing flak vests of various types, there was an urgent need for additional body protection, especially in the neck area. Special armor was developed and sent to Southeast Asia. Pilot attitudes toward wearing armor and user evaluations of the new armor were studied in 35 aircrewmen. The study included evaluations in UC-123, O-1, U-10, and A1E aircraft. Eighty percent of the

aircrewmen interviewed had recent combat experience in Vietnam, and the group averaged 11.8 years of service and 10.7 years of flying experience. Collectively, the group had flown 8,775 combat missions and accumulated 13,660 combat hours. The study reports that USAF pilots want the best armor available but felt that the present body armor was only fair and improvements are needed.

N69-34763# Direction des Recherches et Moyens d'Essais, Paris (France)

PROTECTIVE BULLET-PROOF VEST [LE GILET DE PROTECTION PARE-BALLE]

G. C. Leomand In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 8 p In FRENCH (See N69-34751 20-04)

Avail: CFSTI

Background to the development of the modern protective bullet-proof vest is given and the final choice of the military, the chasuble form, is described. Shoulder straps of 14 cm. thick, layered nylon fabric join the front and back sections covering the superior portions of the body. Details of the unique construction include analysis of the plaquettes which are alveolar in type, of polyester-fiber glass, and the basic units which block penetration of a projectile. A general performance record from the field experience of service men is provided to demonstrate protection against grenades, various flying fragments, and direct impact. The psychological advantages and problems of adjustment to any long period of use are also discussed.

N69-34764# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

DEVELOPMENT OF AN AIRCREW SAFETY HARNESS WITH SPECIAL REFERENCE TO THE F111 AIRCRAFT

D. C. Reader *In* AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 6 p refs (See N69-34751 20-04)

Avail: CFSTI

The principles of safety harness design are discussed, and a method of harness assessment is presented. As an illustration the development and assessment of an alternative British harness for the F-111 is described. The British harness was compared with the American harness in experiments, conducted first at low levels of acceleration (1 G) and then at higher levels (up to 17 G) induced by swinging human subjects in a suspended replica seat and arresting the swing with cables. The improved restraint afforded by the British harness coupled with its operational advantages has led to its acceptance as a replacement for the American harness in all F-111 aircraft.

N69-34765# Naval Air Development Center, Johnsville, Pa. Aerospace Crew Equipment Dept.

PHYSIOLOGICAL ASSESSMENT OF AIRCREW PROTECTIVE SUIT SYSTEMS UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

Louis J. SantaMaria In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 10 p refs (See N69-34751 20-04)

Avail: CFSTI

The protection of aircrew personnel under adverse environmental conditions encountered during the overall mission and potential emergency is a problem of continuing importance. Different protective suit systems (PSS) have been designed to satisfy requirements for environmental protection in the maintence of a

physiologically tolerable level of thermal equilibrium in the in-flight condition, as well as in the emergency condition. The problem is further complicated by the very nature of the aircraft (helicopter, patrol, fighter, and attack), each endowed with peculiar conditioning systems and mission profiles. Among the PSS considered are the USN MK5A suit assembly, the divers' wet suit, and a polyvinylchloride suit. Simulated environments of extreme cold, both dry (-40°F temperature) and immersion cold (32°F water temperature), and moderate heat were induced in the physiological assessment of the various PSS. The adequacy of the protective suits under different conditions of exposure was based on measures of body temperature, heart rate, and weight loss.

N69-34766# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE WATER COOLED SUIT

D. F. Ingram In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 6 p refs (See N69-34751 20-04)

Avail: CFSTI

Some literature on water cooled garments is reviewed. Several problems still await solution, of these the ability of skin sensation to guide the correct selection of inlet temperature to maintain thermal balance, and the effect of vasoconstriction on the performance of the suit are discussed in detail.

Author

N69-34767# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

FLASHBLINDNESS PROTECTION SYSTEM

Gloria T. Chisum *In* AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 9 p (See N69-34751 20-04) Avail: CFSTI

The inability to provide satisfactory protection from high intensity flashes of light by use of fixed density goggles, without at the same time severely reducing the light available for performance of visual tasks, led to a search for some alternative mode of protection. The ideal flashblindness protection system would be one which has an open transmission of one hundred percent, places no restriction on the field of view, immediately attenuates the light with a density just sufficient to prevent a change in vision with the onset of the flash and clears automatically as the light level is reduced. The ideal system is not in the forseeable future. The most recent development in flashblindness protection is the Navy Photometric System which provides a dynamic, indirectly actuated, automatically clearing goggle. The characteristics, advantages and disadvantages of the system are described.

N69-34768# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

CARDIOVASCULAR ASPECTS OF HYPODYNAMICS

Malcolm C. Lancaster In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 9 p refs (See N69-34751 20-04)

Avail: CFSTI

Exposure to inactivity produces a gradual decrease in cardiac stroke volume and a rise in resting pulse rate. There is also a decrease in oxygen transport capability. These changes, combined with a decrease in plasma volume and red cell mass and a loss of skeletal muscle, produce a significant decrease in work capacity which fails to completely return during three weeks ambulation. Prevention of this deconditioning by exercise during bed rest appears to be feasible and is being studied. Orthostatic intolerance resulting from bed rest was not obviated by restoration of plasma volume

using drugs but can be obviated by exposure to lower body negative pressure during the final few days of bed rest. Decreased sympathetic nervous activity appears to be a factor in producing this intolerance but other factors may be important. Unlike the decreased work capacity, orthostatic tolerance tends to be restored within 48 to 72 hours of ambulation.

N69-34769# Air Force Systems Command, Brooks AFB, Tex. THE METABOLIC AND HEMATOLOGIC ASPECTS OF HYPODYNAMICS

J. H. Triebwasser In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 16 p refs (See N69-34751 20-04)

Avail: CFSTI

The metabolic and hematologic consequences of prolonged bed rest are correlated to those observed and postulated in weightlessness. Some are a result of a change in level of activity, and others are secondary to a change in posture. The caloric requirement and metabolic rate decreases. The nitrogen, sulfur, and potassium balances become negative. Their ratio indicates depletion of muscle mass. The calculated total muscle mass loss over a six week period is approximately 1.7 kilograms. However, the body weight remains constant at the expense of increased adipose tissue formation. There is a progressive increase in urinary calcium excretion during bed rest which is independent of the calcium intake. In addition to a decrease in plasma volume, there is a reduction in the red cell mass. Ferrokinetic studies, as well as other tests, suggest decreased red cell production during bed rest. During recovery a further decrease is noted. Several studies suggest hemolysis as an explanation for this observation. Cortisol production and its diurnal variation is not appreciably altered.

N69-34770# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

OBSERVATIONS ON THE GAS TENSIONS OF MIXED VENOUS BLOOD IN MAN

D. M. Denison In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 5 p refs (See N69-34751 20-04)

Avail: CFSTI

Mixed venous gas tensions have not been measured frequently in the past. Modern instruments have made it easier to do so. This small series of observations, made over a wide range of conditions, suggests that a rebreathing technique can measure them and that they behave in the way expected if in vitro dissociation curves were to apply in vivo. Experiments completed since the presentation have shown that: (1) The method can be applied to the study of exercise during total water immersion. (2) A complex relationship exists between the CO₂ tensions of pulmonary artery blood and rebreathed gas, although their oxygen tensions are identical.

N69-34771# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

THE EFFECTS OF PROLONGED EXPOSURE TO HIGH OXYGEN TENSION

George H. Kydd In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 8 p refs (See N69-34751 20-04)

Avail: CFSTI

The effects as manifested in rats during up to 47 days of exposure, but principally at 30 days, were studied. These

experiments were carried out at a pressure that is high but just short of that capable of producing terminal edema (2/3 atmosphere). Under these conditions, rats developed changes in the pulmonary vasculature that appeared to be hypertrophic and in some cases hyperplastic that suggested a greater turnover of tissue in the vessels. Further investigation showed that the rats developed pulmonary hypertension and systemic hypotension. In view of the vascular changes, these effects are attributed to an increased vascular resistance and a decreased cardiac output from the right heart. The long term significance of these effects have not been studied, but it is suggested that they would be ameliorated by return to air breathing.

N69-34772# Air Force Systems Command, Brooks AFB, Tex. Aerospace Medical Div.

FIRE PREVENTION AND PROTECTION IN OXYGEN ENRICHED ATMOSPHERES

Donald I. Carter *In* AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 10 p refs (See N69-34751 20-04)

Avail: CFSTI

Fire safety aspects of ground-based simulators which use oxygen enriched atmospheres in research, testing and hyperbaric therapy are discussed. Improvements which have been made in removing combustible materials, in removing ignition sources and in providing fire extinguishing systems are emphasized.

Author

N69-34773# Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris (France).

INFLUENCE OF MAGNETIC FIELD VARIATIONS ON THE GROWTH OF CERTAIN MICROORGANISMS [INFLUENCE DES VARIATIONS D'UN CHAMP MAGNETIQUE SUR LA CROISSANCE DE CERTAINS MICRO-ORGANISMES]

L. Miro, G. Deltour, and A. Pfister In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 7 p In FRENCH (See N69-34751 20-04)

Avail: CFSTI

Three series of experiments placing growing Escherischia coli cultures in the presence of varying levels of magnetic field influence are reported. In a magnetic field of 42,000 gauss, no appreciable change in growth rate was determined; however, differences of metabolic output were provoked after each variation, and sudden increases in growth rates according to the number of viable cells counted. Daughter cells produced during this period were considered to be polynuclear and to have inferior nuclear structures to the mother bacteria.

N69-34774# Royal Air Force, Farnborough (England). AEROMEDICAL EVACUATION

D. W. Atkinson *In* AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 10 p (See N69-34751 20-04) Avail: CFSTI

Aircraft flown on RAF scheduled aeromedical flights from Singapore, Bahrein, and Germany, as well as those used for the UK internal flights, are described. The problems of non-scheduled flights, communications, and certain medical categories involved are mentioned. Equipment is briefly described. Aeromedical evacuation units were developed for tactical operational use which are self-contained in personnel and equipment including transport.

Author

N69-34775# Duesseldorf Univ. (West Germany). Univ. Hospitals. EXPERIENCES IN AIR TRANSPORT OF PATIENTS IN PEACETIME

Roger Ney In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 5 p (See N69-34751 20-04) Avail: CFSTI

Thirty-five helicopter emergency evacuation missions in Germany are summarized, including advantages, future possibilities for use, and limitations of such techniques. Medical requirements are treated, as well as possible effects of low level flying. Cost considerations are also taken into account.

Author

N69-34776# Naval Air Systems Command, Washington, D.C. AEROMEDICAL PROBLEMS IN THE RESCUE OF DOWNED

Roland A. Bosee and James F. Parker, Jr. (BioTechnology, Inc.)

In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 8 p (See N69-34751 20-04)

Avail: CFSTI

Aeromedical problems arising during the rescue of downed airmen under combat conditions and the need for new or improved rescue equipment and techniques are discussed. Interviews were conducted with medical personnel and rescue teams recently returned from Southeast Asia. A total of 42 rescues was studied. Information was obtained concerning the rescue and medical support equipment used, rescue techniques employed, type and frequency of survivor injuries, and problems encountered during rescue operations. Results show the range of injuries sustained by aircrew personnel under combat conditions dictates the need for certain classes of medical support equipment to be carried in rescue vehicles and specific training to be given to helicopter rescue crewmen. The injury classes include: (1) serious loss of blood from lacerations caused by penetrating shell fragments, (2) spinal fractures and severe cervical strains, (3) fractures of one or more extremities, and (4) shock. The equipment carried and the training of rescue crewmen must be appropriate for these injuries. Author

N69-34777# Air Force Systems Command, Brooks AFB, Tex. Aerospace Medicine Div.

RECENT ADVANCES AND NEW CONCEPTS IN THE AIR EVACUATION OF PATIENTS IN CARGO TYPE AIRCRAFT

John E. Murphy In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 11 p refs (See N69-34751 20-04)

Avail: CFSTI

Recent advances in the development of medical equipment have provided for the capability to safely and comfortably move sick and wounded casualties in multi-mission cargo-type aircraft. The requirement for reduced weight and bulk inherent in the air transport mode has led to many innovations and adaptations in equipment. Equipment has been developed to facilitate the reconfiguration into an air evacuation mode in less than one hour, so that casualties may be evacuated by the same aircraft that delivers supplies to forward area airheads. Special medical equipment has been designed for use in the several multi-mission aircraft (C-7, C-123, C-130, C-141) that perform short-range tactical missions. On long range aeromedical evacuation missions, a special care unit is presently being developed to enable seriously ill patients to be moved over long distances when adequate medical capability is not available at the originating site. Described are methods for the rapid conversion of cargo aircraft into the aeromedical evacuation role. Also presented are the contributions of specialized medical equipment to transport casualties in cargo-type aircraft for both the Tactical and Strategic Aeromedical Evacuation.

N69-34778# Air Force Systems Command, Brooks AFB, Tex. Aerospace Medical Div.

MEDICAL CONSIDERATIONS AFFECTING EARLY AIR EVACUATION OF THE SERIOUSLY ILL PATIENT

Robert C. McIver and John E. Murphy In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 5 p (See N69-34751 20-04) Avail: CF5TI

Evacuations of seriously ill or injured patients, both before and after definitive medical care has been administered, is discussed and evaluated. It is concluded that such patients can be transported by air with greatest chance of survival if their condition has been stabilized from a cardiovascular, respiratory, and renal standpoint prior to flight. Frequent gravitational changes, turbulence, partial reduction in oxygen pressure, dry air, and crowded conditions are among the most frequent conditions which affect the patient's safety. Proper guidelines for controlling these situations, however, can be established.

N69-34779# Air Force Systems Command, Brooks AFB, Tex. Aerospace Medical Div.

RESEARCH AND DEVELOPMENT IN SUPPORT OF AEROMEDICAL EVACUATION

Fritz M. G. Holmstrom, Virginia M. Alena, and Lynn B. Rowe In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 13 p (See N69-34751 20-04) Avail: CFSTI

The primary objectives of the USAF research and development program to improve inflight patient care are presented and certain related efforts summarized. The logic of these efforts as part of an orderly integrated developmental program designed to advance both theory, equipment and practices is touched upon. The continuing requirement to identify, in advance of the need, the kind of research and development that should be undertaken now in order to take advantage of the potential that will be offered by future advanced aircraft systems remains as an underlying theme.

N69-34780# Headquarters Army Aviation, Middle Wallop (England).

A LIGHTWEIGHT PLASTIC LITTER

I. C. Perry In AGARD Pattern Recognition. Body Armour and Aircrew Equipment Assemblies. Current Space Med. Probl. Aeromed. Evacuation Oct. 1968 12 p (See N69-34751 20-04) Avail: CFSTI

The arguments for such a piece of equipment are put forward, and some arguments against it are given. The idea of a simple molded plastic litter to replace conventional poles with something strong between them is not easy to accept after so many years getting the general stretcher perfected. However, the stretcher is not desired by the aircraft designers, as it is too long, cumbersome, heavy, and always presents problems. It is suggested, therefore, that a change is definitely required.

N69-34784# California Univ., Berkeley. Lawrence Radiation Lab. CHEMICAL BIODYNAMICS Annual Report, 1967

Melvin Calvin et al 1 Jun. 1968 134 p refs (Contract W-7405-ENG-48) (UCRL-18216) Avail: CFSTI

CONTENTS:

- 1. ANIMAL, PLANT, AND BACTERIAL BIOCHEMISTRY p 1-43 refs (See N69-34785 20-04)
- 2. BIOPHYSICAL CHEMISTRY AND BIOPHYSICS p 45-80 refs (See N69-34786 20-04)
- 3. ORGANIC CHEMISTRY AND GEOCHEMISTRY $\,p\,$ 81 98 refs (See N69-34787 20-06)
- 4. PHOTOCHEMISTRY AND RADIATION CHEMISTRY p 99 112 refs (See N69-34788 20-06)

N69-34785# California Univ.. Berkeley. Lawrence Radiation Lab. ANIMAL, PLANT, AND BACTERIAL BIOCHEMISTRY

In its Chem. Biodyn. 1 Jun. 1968 p 1 43 refs (See N69-34784 20-04)

Avail: CFSTI

The effects of differential enriched or impoverished experiences on brain measurements in rats are described, and the biosynthesis of opium alkaloids thebaine and of nicotine are discussed. A study of the dynamic metabolic regulation of the photosynthetic carbon reduction cycle is presented.

F.O.S.

N69-34786# California Univ., Berkeley. Lawrence Radiation Lab. BIOPHYSICAL CHEMISTRY AND BIOPHYSICS

In its Chem. Biodyn. 1 Jun. 1968 p 45 80 refs (See N69-34784 20-04)

Avail: CFSTI

The research in biophysical chemistry and biophysics is reported. Subjects covered are: (1) ribonucleic acid structure, (2) hydration of DNA, (3) polymer dynamics, (4) chlorophyll interactions, (5) light reactions in spinach chloroplasts, (6) excitation transfer by chlorophyll, (7) EPR signal in *Rhodospirillum rubrum*, (8) spin-lattice relaxation, and (9) autoradiography of tritium on chromatograms.

N69-34796# Aktiebolaget Atomenergi, Stockholm (Sweden). NUCLEAR CARDIAC PACEMAKERS

Göran Carleson and Lennart Svensson In its Nucl. Chem. May 1969 p 36–37 refs (See N69-34789 20-06) Avail: CFSTI

A cardiac pacemaker prototype powered by an isotopic battery is being developed and manufactured. Various design parameters and gamma sterilization problems have been studied.

Author (ESRO)

N69-34826# Joint Publications Research Service, Washington, D.C.

SPACE BIOLOGY AND MEDICINE, VOLUME 3, NO. 2, 1969
15 Jul. 1969 128 p refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina" v. 3, no. 2 Moscow, Meditsina Publishing House, 1969 p 3 - 77
(JPRS-48416) Avail: CFSTI

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- 1. MYOCARDIAL CHANGES IN RABBITS FOLLOWING THEIR CHRONIC WHOLE-BODY IRRADIATION (KARYOMETRIC DATA) Ye. I. Vorb'yev et al p 1 10 refs (See N69-34827 20-04)
- 2. EFFECT OF THE ALCOHOL-SOLUBLE FRACTION OF A BIOMASS OF PROTOCOCCAL ALGAE ON WHITE RATS A. V. Novikova et al p 11 15 refs (See N69-34828 20-04)
- 3. PROTECTIVE EFFECT OF ANTIHYPOXIC DRUGS DURING GRAVITATIONAL ACCELERATIONS V. M. Vinogradov et al p 16 21 refs (See N69-34829 20-04)
- 4. SOME METABOLIC INDICES OF ANIMALS DURING PROLONGED EXPOSURE TO A HYPEROXIC ATMOSPHERE WITH NITROGEN OR HELIUM A. G. Zhironkin et al p 22-28 refs (See N69-34830 20-04)
- 5. GAS EXCHANGE OF SOME VEGETABLES IN A HYPEROXIC ATMOSPHERE N. T. Nilovskaya p 29-36 refs (See N69-34831 20-04)
- 6. PECULIARITIES OF VESTIBULAR REACTIONS OF RATS EXPOSED TO ARTIFICIAL HYPOTHERMIA I. I. Voinova et al p 37 44 refs (See N69-34832 20-04)
- 7. CIRCADIAN RHYTHMS OF PHYSIOLOGICAL FUNCTIONS IN FLIGHT PERSONNEL A. V. Chapek p 45-52 refs (See N69-34833 20-04)

- 8. EFFECT OF ALTERNATING WORK AND REST CYCLES ON THE HUMAN BODY IN ISOLATED ENVIRONMENTS B. A. Dushkov et al. p. 53 62 refs. (See N69-34834 20-04)
- 9. CHANGE IN PRECISE MOVEMENTS IN PERSONS WITH DIFFERENT PHYSICAL FITNESS WHEN EXPOSED TO HYPOKINESIA A. A. Korobova et al p 63-70 refs (See N69-34835 20-04)
- 10. COORDINATION OF HUMAN MOVEMENTS DURING ALTERNATING EXPOSURE TO ACCELERATIONS AND WEIGHTLESSNESS M. A. Cherepakhin p 71-76 refs (See N69-34836 20-04)
- 11. EFFECT OF LONG-TERM, HYPOKINESIA ON HUMAN TOLERANCE TO PHYSICAL STRESS B. S. Katkovskiy et al p 77 85 refs (See N69-34837 20-04)
- 12. USE OF A TWO-GAS ARTIFICIAL ATMOSPHERE IN MANNED SPACESHIPS E. V. Bondarev et al p 86-93 (See N69-34838 20-04)
- 13. A METHOD FOR MEASURING PHYSIOLOGICAL INDICES USING AN ELECTRONIC COMPUTER A. P. Kalinovskiy p 94-101 refs (See N69-34839 20-04)
- 14. PHAGOCYTIC ACTIVITY AND CARBOHYDRATE METABOLISM OF NEUTROPHILS IN HUMANS EXPOSED TO HYPEROXIC ATMOSPHERES A. S. Kaplanskiy et al p 102 107 refs (See N69-34840 20-04)
- 15. CONVEYER CULTIVATION OF CARROTS BY THE AEROPONICS METHOD Ye. V. Lebedeva et al p 108 110 (See N69-34841 20-04)
- 16. APPEARANCE OF CHROMOSOMAL REARRANGEMENTS IN THE EPITHELIUM OF THE CORNEA OF MICE DURING GENERAL PROLONGED GAMMA IRRADIATION T. M. Zukhbaya et al p 111 113 refs (See N69-34842 20-04)
- 17. REVIEW OF *PROBLEMS IN SPACE MEDICINE*, VOLUME 6 I. M. Khazen et al. p. 114 119 (See N69-34843 20-04)

N69-34827# Joint Publications Research Service, Washington, D.C.

MYOCARDIAL CHANGES IN RABBITS FOLLOWING THEIR CHRONIC WHOLE-BODY IRRADIATION (KARYOMETRIC DATA)

Ye. I. Vorbyev et al. In its Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p 1 – 10 refs (See N69-34826 20-04) Avail: CFSTI

The animals were subjected to whole body irradiation with a dose of 20 R/day, receiving a total dose of 500, 1500 and 2400 R. The tissue changes were evaluated using histologic and karyometric techniques. On the tenth day after irradiation with any of the doses, there was a decrease in the size of muscular nuclei against a background of interstitial edema, vascular hyperemia and dystrophically changed muscle fibers. The decrease persisted for three to six months after the exposure. The development of myofibrosis in the myocardium was accompanied by the formation of muscle fibers with large and gigantic cells. This can be considered a manifestation of compensation and repair processes in the myocardium.

 $\begin{tabular}{lll} N69-34828\# & Joint Publications Research Service, Washington, D.C. \end{tabular}$

EFFECT OF THE ALCOHOL-SOLUBLE FRACTION OF A BIOMASS OF PROTOCOCCAL ALGAE ON WHITE RATS

A. V. Novikova et al. *In its* Space Biol. and Med., vol. 3, no.2, 1969 15 Jul. 1969 p. 11 – 15 refs (See N69-37826 20-04)
Avail: CFSTI

Experiments were carried out on 40 white male rats to determine the effect from feeding the animals with an alcohol-soluble fraction of protococcal algae. The diet included alcohol-bleached and unbleached biomasses of Chlorella and Scenedesmus. The animals fed with an unbleached biomass displayed a decrease in body weight and an increase in adrenal weight. Upon a histological examination they also exhibited certain changes in the adrenal cortex and glomerules.

N69-34829# Joint Publications Research Service, Washington, D.C.

PROTECTIVE EFFECT OF ANTIHYPOXIC DRUGS DURING GRAVITATIONAL ACCELERATIONS

V. M. Vinogradov et al *In its* Space Biol. and Med., vol. 3, no. 2, 1969 15 Jul. 1969 p 16-21 refs (See N69-34826 20-04) Avail: CFSTI

The protective effect of substances with antihypoxic properties was studied using thiorea and gutimine derivatives. Experiments were conducted on more than 1500 white mice and 250 rats which were placed in holders of a redesigned centrifuge with a precisely calibrated tachometer. Most observations were made with gutimine at various doses and during different stages of acceleration. Results indicated nearly complete cerebral and cardiac anoxia of short duration (90 sec), well below human tolerances. It was therefore concluded that antihypoxic drugs show promise in protecting the body against brief, lethal accelerations, possibly in combination with simultaneous use of other substances whose positive influence under these conditions has already been demonstrated.

A.C.R.

N69-34830# Joint Publications Research Service, Washington, D.C.

SOME METABOLIC INDICES OF ANIMALS DURING PROLONGED EXPOSURE TO A HYPEROXIC ATMOSPHERE WITH NITROGEN OR HELIUM

A. G. Zhironkin et al. In its Space Biol. and Med., vol. 3, no. 2, 1969 15 Jul. 1969 p 22-28 refs (See N69-34826 20-04) Avail: CFSTI

A nine-day experiment was carried out to study changes in the oxygen consumption and rectal temperature of mice exposed to a 80% oxygen atmosphere containing nitrogen or helium as diluents. The results suggest that an increased oxygen concentration is the crucial factor influencing the gas exchange and body temperature of animals exposed to a hyperoxic atmosphere with either nitrogen or helium. The studied variables decreased in both gas mixtures. However, in the helium-oxygen atmosphere a reduction of the oxygen consumption occurred later, and the drop in rectal temperature was less pronounced than in the nitrogen-oxygen atmosphere.

N69-34831# Joint Publications Research Service, Washington, D.C.

GAS EXCHANGE OF SOME VEGETABLES IN A HYPEROXIC ATMOSPHERE

N. T. Nilovskaya *In its* Space Biol. and Med., vol. 3, no. 2, 1969 15 Jul. 1969 p 29 – 36 refs (See N69-34826 20-04) Avail: CFSTI

The intensity of photosynthesis and respiration of vegetables which appear appropriate for growth in space hot-houses (potatoes, beets, common and Chinese cabbage) was investigated in atmospheres with different oxygen $(160-372\ \text{mm}\ \text{Hg})$ and carbon dioxide $(0.76-3.8\ \text{mm}\ \text{Hg})$ partial pressures under various illumination conditions $(50-200\ \text{W/m}\ \text{\reflet})$. An increase in oxygen partial pressure in the atmosphere over 160 mm Hg reduced the photosynthetic activity of plants, simultaneously increasing their night respiration. The effect of oxygen on plant gas exchange depended on its concentration and the plant species. With a decrease in radiant energy, the inhibitory effect of the increased oxygen concentrations on photosynthesis increased significantly. A reduction of the carbon dioxide partial pressure in the atmosphere produced a similar effect.

N69-34832# Joint Publications Research Service, Washington, D.C.

PECULIARITIES OF VESTIBULAR REACTIONS OF RATS EXPOSED TO ARTIFICIAL HYPOTHERMIA

I. I. Voinova et al. In its Space Biol. and Med., vol. 3, no. 2, 1969
 Jul. 1969 p. 37 – 44 refs (See N69-34826 20-04)
 Avail: CFSTI

Peculiarities of the vestibular function of animals exposed to artificial hypothermia induced by various techniques were investigated in 34 rats. Upon exposure to angular accelerations, the rectal temperature of the animals was reduced to $32-30\,^\circ$; use of the hypercapnia-hypoxia technique revealed an increase in the duration and number of beats of the post-rotational nystagmus and an increase in respiration rate. With a further cooling of rats to $27-20\,\ensuremath{^\circ}\xspace$, the indices gradually decreased. The animals were cooled to a hypothermic state using premedication with promedol and pipolfen, and there was a continuous decrease in the nystagmic reaction at every stage of their cooling. The vestibular reflexes disappeared at a body temperature of 21°C brought about by both techniques. The variations seen in the development of vestibular reactions of the cooled animals can be attributed to a gradual inhibition of the central nervous system occurring in the descending direction. The changes in the main cortical processes during early stages of hypothermia primarily affected the relationship between the level of vestibular stimulation and response.

N69-34833# Joint Publications Research Service, Washington,

CIRCADIAN RHYTHMS OF PHYSIOLOGICAL FUNCTIONS IN FLIGHT PERSONNEL

A. V. Chapek *In its* Space Biol. and Med., vol. 3, no. 2, 1969 15 Jul. 1969 p 45-52 refs (See N69-34826 20-04) Avail: CFSTI

Circadian rhythms of physiological functions of pilots travelling through six or more time zones during the daytime and nighttime were studied. The biological rhythms of physiological functions were concordant with the time zone of their permanent residence. The lowest indices of physiological functions were recorded at 0400 hours, whereas the highest were noted between 1600 and 2000 hours. The functions of the central nervous system, optical and cardiovascular systems decreased as a result of night flights made between 2300 and 0500 hours.

N69-34834# Joint Publications Research Service, Washington,

EFFECT OF ALTERNATING WORK AND REST CYCLES ON THE HUMAN BODY IN ISOLATED ENVIRONMENTS

B. A. Dushkov et al *In its* Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p 53 – 62 refs (See N69-34826 20-04) Avail: CFSTI

The performance and behavior of two well-selected groups of six test subjects (two shifts) restricted to a small chamber were studied during four seven-day experiments. The test subjects adhered to an alternating daily routine of six-hour work and rest cycles (including four hours of sleep), performing various mental and physical tasks. The duration of the sleep and wakefulness cycles was similar in both groups. However, test subjects in the second group spent 72% of their working hours on physical exercises, mental work and training, whereas those in the first group spent only 5.5% of their time on these tasks. The functional state and performance of the test subjects were evaluated by comprehensive studies including physiological, psycological and biochemical tests. The test subjects of the first shift showed impairment of their functional state and performance level. The test subjects of the second shift exhibited good mental and physical performance throughout the experiment. This can be attributed to a favorable effect of physical exercises, functional music, vitamins and physiological stimulation used in accordance with the Kekcheyev

N69-34835# Joint Publications Research Service, Washington, D.C.

CHANGE IN PRECISE MOVEMENTS IN PERSONS WITH DIFFERENT PHYSICAL FITNESS WHEN EXPOSED TO HYPOKINESIA

A. A. Korobova et al. *In its* Space Biol. and Med., vol. 3, no. 2, 1969 15 Jul. 1969 p. 63 – 70 refs (See N69-34826 20-04) Avail: CFSTI

Changes in the coordination of athletes (runners and weight lifters) exposed to a 40-day bedrest were investigated by the method of vector-operation dynamography. The tests were conducted before and after exercises (performed with a limited load with a bicycle-type erogometer and with a maximum load with a treadmill). A decrease in motor activity resulted in insignificant changes in the level of total error. Use of exercises of the two types helped to reveal qualitative differences (predominance of positive efforts) in the performance of the task.

N69-34836# Joint Publications Research Service, Washington, D.C.

COORDINATION OF HUMAN MOVEMENTS DURING ALTERNATING EXPOSURE TO ACCELERATIONS AND WEIGHTLESSNESS

M. A. Cherepakhin *In its* Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p 71 – 76 refs (See N69-34826 20-04)

Human motor coordination was studied during jet flights in a Keplerian trajectory. The test subjects had no experience in performing flights during weightlessness. During exposure to weightlessness or accelerations the test subject pressed the rigid surface of a tensometric dynamometer, the second effort being twice as weak as the first one. The mechanogram and accelerogram were simultaneously recorded by an oscillograph. During the early exposures the trained motor habit was disturbed, but with repeated flights the disturbances gradually disappeared. The effect of weightlessness on motor activity, on the one hand, involved the influence of zero gravity as such and, on the other, the effect of a novel factor inherent in any unusual environment. The change in body weight and the primary characteristics of the motor habit varied in conformity with motor perseverance, the latter constituting a disorder in motor coordination. The weightlessness state produced an increase in muscular tension at an early period of the exposure. Author

N69-34837# Joint Publications Research Service, Washington, D.C.

EFFECT OF LONG-TERM HYPOKINESIA ON HUMAN TOLERANCE TO PHYSICAL STRESS

B. S. Katkovskiy et al. *In its* Space Biol. and Med., vol. 3, no. 2, 1969 15 Jul. 1969 p 77-85 refs (See N69-34827 20-04) Avail; CFSTI

A 62-day bedrest experiment was performed on six healthy male test subjects. During the experiment an attempt was made to maintain high performance of three test subjects (first group) using physical exercises which compensated for their muscular inactivity (with respect to metabolic rates). The motor activity of the resting subjects (second group) was minimized. After the bedrest experience the tolerance of the members of the second group to physical work decreased, whereas the members of the first group retained tolerance to both moderate and heavy work. The experimental findings suggest that deterioration of the performance level of human subjects subjected to bedrest is due to hypokinesia.

N69-34838# Joint Publications Research Service, Washington, D.C.

USE OF A TWO-GAS ARTIFICIAL ATMOSPHERE IN MANNED SPACESHIPS

E. V. Bondarev et al *In its* Space Bio. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p 86 – 93 (See N69-34826 20-04) Avail: CFSTI Experiments were conducted to investigate the development of decompression sickness occurring in humans upon their transition from a nitrogen – oxygen atmosphere, with a total pressure of 400 mm Hg, to an oxygen atmosphere, with a pressure of 170 mm Hg. To a certain extent this simulates the decompression from a spaceship cabin environment to suit atmosphere during extravehicular activity. No subjective complaints or objective symptoms peculiar to various forms of decompression sickness were recorded. This suggests that the two-gas mixture assessed in the experiment can be successfully used in space missions involving suited extravehicular operations.

N69-34839# Joint Publications Research Service, Washington, D.C.

A METHOD FOR MEASURING PHYSIOLOGICAL INDICES USING AN ELECTRONIC COMPUTER

A. P. Kalinovskiy *In its* Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p 94-101 refs (See N69-34826 20-04)

A computer-aided interpolation technique specifically applicable for physiological data analysis is described. The technique is based on the computation of the coordinates of points of individual functions as the intersection of two straight lines which interpolate the function between the point to be defined and adjacent sampling points on the right and left respectively. In addition to the essential simplicity of the computation procedure, the technique ensures sufficient accuracy in physiological measurements.

N69-34840# Joint Publications Research Service, Washington, D.C.

PHAGOCYTIC ACTIVITY AND CARBOHYDRATE METABOLISM OF NEUTROPHILS IN HUMANS EXPOSED TO HYPEROXIC ATMOSPHERES

A. S. Kaplanskiy et al *In its* Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p 102-107 refs (See N69-34826 20-04)

Avail: CFSTI

Four healthy male volunteers were used, two of whom were exposed for ten days in a 53% $\rm O_2$ atmosphere, whereas the other two were exposed for 14 days to a 40% $\rm O_2$ atmosphere. It was found that an increase in the oxygen concentration in the breathed air resulted in reduced phagocytic activity of neutrophils in the peripheral blood. In addition, it was demonstrated cytochemically that the glycogen content in the neutrophils remained unaltered, whereas the activity of phosphorylase and UDPG-glycogen synthetase decreased slightly. The relationship between energy metabolism and the function of the neutrophils is discussed. It was found that the toxic effect of oxygen manifests itself at a concentration of 40% in the breathing air and that human individual sensitivity to oxygen varies greatly.

N69-34841# Joint Publications Research Service, Washington, D.C.

CONVEYER CULTIVATION OF CARROTS BY THE AEROPONICS METHOD

Ye. V. Lebedeva et al. *In its* Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p. 108-110 (See N69-34826 20-04) Avail: CFSTI

An evaluation of the possibility of cultivating root vegetables by the aeroponics method is made. The investigated object was carrots of the Nantskaya variety, which in the human diet serve as a basic source of carotine (provitamin A). Carrots were cultivated in a non-air conditioned room, where air temperature and humidity were not regulated. Daily yield from the method is given, as well as tabulated data on the chemical composition determined from 19 yields.

N69-34842# Joint Publications Research Service, Washington, D.C.

APPEARANCE OF CHROMOSOMAL REARRANGEMENTS IN THE EPITHELIUM OF THE CORNEA OF MICE DURING GENERAL PROLONGED GAMMA IRRADIATION

Zukhbaya et al. *In its* Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p. 111 – 113 refs (See N69-34826 20-04) Avail: CFSTI

In relation to the effect of acute irradiations on the animal body, the influence of single general gamma radiation at varying dosages on the appearance of chromosomal rearrangements was studied. These changes were compared with the level of damage to the entire body. Used were 350 white, nonlinear, sexually mature mice of both sexes weighing $16-20~\rm g$. Ninety experimental mice formed a control group, and the other 260 were divided into eight groups. All the animals, other than the control mice, were irradiated with Co^{60} gamma rays. Data on the irradiation regimes are given in the table.

N69-34843# Joint Publications Research Service, Washington, D.C.

REVIEW OF <u>PROBLEMS IN SPACE MEDICINE</u>, VOLUME 6

I. M. Khazen et al. *In its* Space Biol. and Med., Vol. 3, No. 2, 1969 15 Jul. 1969 p 114 – 119 (See N69-34826 20-04)

Avail: CFSTI

Recent research into the problems of space biology, particularly those associated with gravitational effects of various types, is reviewed. Emphasis is placed on studies of hypodynamia, physiological responses to transverse acceleration, influence of acceleration on the cardiovascular system, and effects of shock acceleration. Methodological approaches, as well as tests using animals as subjects, are also mentioned.

A.C.R.

N69-34866*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

HYPERTENSION AND DIPSOTHERAPY [HYPERTONIE UND DURSTKUREN]

Heinz Strauss Washington NASA Aug. 1969 5 p refs Transl. into ENGLISH from Z. Urol. (Leipzig), v. 22, 1928 p 691 – 693 (Contract NASw-1692)

(NASA-TT-F-12506) Avail: CFSTI CSCL 06D

Survey of therapeutic approaches to hypertension involving adjustments of fluid intake is presented. The then-current (1927) literature on the subject and attempts to consider casual relationships between fluid intake and hypertension is surveyed.

Author

N69-34879*# Department of Agriculture, Washington, D.C Natural Resource Economics Div.

AN EVALUATION OF CROP AND LAND USE DATA IN A WORLD SAMPLE OF COUNTRIES

Simon Baker Nov. 1968 25 p refs (NASA Order R-09-038-002)

(NASA-CR-103944) Avail: CFSTI CSCL 02B

The main objective of this study was to provide information useful in determining how, and to what extent, remote sensing might help in supplying more accurate, comprehensive, and timely data on crop areas, crop yields, crop production, and land use around the world. Remote sensing is the method used to collect such data about the earth's surface. This method utilized optical, electro-optical, and electronic devices mounted in airplanes or satellites. Remote sensing promises to close some of the remaining gaps in available data, and to improve data quality and timeliness. It may be possible, through remote sensing, to replace some present methods with less costly methods.

N69-34883*# Bellcomm, Inc., Washington, D.C.

BIOLOGICAL GENERALIZATIONS AND THE SEARCH FOR EXTRATERRESTRIAL LIFE

D. B. Hoffman and A. N. Kontaratos 22 Jan. 1969 55 p refs (Contract NASw-417)

(NASA-CR-104060; TR-69-710-1) Avail: CFSTI CSCL 06C

A framework for a systematic approach to the search for extraterrestrial life is provided. Possible universal attributes of life are derived from inferences based on the functional characteristics, the material building blocks, the levels of organization, and the origin and evolution of terrestrial life. These generalizations are divided into hereditary, morphological, metabolic, and ecological categories and, like other scientific hypotheses, are subject to refinement and change. Some limitations of operational approaches to the search for extraterrestrial life are identified. Working assumptions are then developed to allow definition of appropriate tests within these limitations. This information is in turn used to establish criteria barring the existence of life, criteria suggesting the possible existence of life, and criteria confirming the existence of life.

N69-34943# California Univ., Livermore. Lawrence Radiation Lab.

FIELD INSTRUMENT FOR PLUTONIUM FECAL SAMPLE ANALYSIS

W. P. Bennett, J. F. Tinney, and J. L. Cate $\mbox{\it In its}$ Hazards Control, No. 31 Aug. 1969 p 31-34 (See N69-34938 20-14) Avail: CFSTI

Sample collection techniques, sample preparation, a prototype fecal sample monitor, and calibration results using known concentrations of plutonium and americium in water are described.

NSA

N69-34947# California Univ., Livermore. Lawrence Radiation

AN EVALUATION OF X-RAY FLUORESCENCE FOR IN VIVO BIOLOGICAL STUDIES

J. F. Tinney and J. L. Cate *In its* Hazards Control, No. 31 Aug. 1968 p 51 – 58 (See N69-34938 20-14) Avail: CFSTI

Some preliminary results are reported in a research program to theoretically and experimentally determine the feasibility of using fluorescent X rays for in vivo biological studies.

Author (NSA)

N69-34980# Joint Publications Research Service, Washington, D.C.

MAN UNDER WATER

A. Smukul 7 Aug. 1969 5 p Transl. into ENGLISH from Tekhn. Vooruzheniye (USSR), no. 6, 1969 p 28-29 (JPRS-48575) Avail: CFSTI

A general discussion of Russian experience on man's acclimatization underwater includes a brief account of three scientific underwater experiments submerged at no greater depth than 60 m. A statement of purpose, problems posed by the autonomous underwater laboratory, individual equipment for aquanauts, and means of communication and transportation are briefly discussed. The design of life support systems which answer every technical need as well as providing comfortable normality to the living conditions is cited as the most pressing problem posed by man under water. A prototype closed-system respiratory apparatus is previewed in which the gas mixture is inhaled from one sack and exhaled into another sack.

N69-35024*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF DIFFERING AMOUNTS OF TRAINING AND OF MONOCHROMATIC TARGETS ON SEXTANT SIGHTING PERFORMANCE

Emmett C. Lampkin and Robert J. Randle Washington Aug. 1969 10 p refs

(NASA-TN-D-5190) Avail: CFSTI CSCL 051

Sighting performance using a standard marine, gimbal mounted sextant with a special telescope substituted for the eyepiece was studied in combinations of simulated monochromatic stars. The stars were simulated by projecting a point source of light onto a parabolic mirror. The point source was provided by placing a lamp behind a 0.0005-inch-diameter aperture and positioning it at the focal point of the parabolic mirror. The collimated image of the aperture being projected was perceived as a star at infinity. The combinations of stars studied were: red-red, white-white, and red-green. It is concluded that five days of training are sufficient for achieving a performance asymptote; and monochromatic stars may be used for sextant sightings, with performance being more consistant from the red end of the spectrum. A discussion of the results is presented.

N69-35025# Ohio State Univ., Columbus. Computer and Information Science Research Center.

REACTION TIME AND UNCERTAINTY IN HUMAN INFORMATION PROCESSING

George E. Briggs Mar. 1969 41 p refs (Grant NSF GN-534)

(PB-184135; CISRC-TR-69-5) Avail: CFSTI

Content: Hight-speed scanning of random figures in human memory: Retrieval time as a function of memory ensemble size: Information processing as a function of speed versus accuracy: Memory retrieval and central comparison times in information processing.

USGRDR

N69-35027*# National Aeronautics and Space Administration, Washington, D.C.

ON THE PROFESSIONAL ACTIVITY OF A COSMONAUT [O PROFESSIONALVIOY DEVATELVIOSTI KOSMOIAVTA]

Yu. Gargarin Aug. 1969 8 p Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 4, 1969 p 9 - 11

(NASA-TT-F-12433) Avail: CFSTI CSCL 05I

The contents concern a new profession, the cosmonaut. Covered are training techniques, education, and work. Also described are some of the sophisticated instruments and tests given the cosmonaut for physical and mental endurance. The purpose of the cosmonaut profession, as described by the author, is to provide new laws and increase the understanding of the universe, and this knowledge is to be used for the good of all man.

E.H.W.

N69-35094*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. SAFETY EQUIPMENT FOR HANDLING THE 20-kW AND 5-kW ARC LAMPS

Maurice J. Argould 15 Apr. 1969 47 p

(Contract NAS7-100)

(NASA-CR-104085; TM-33-429) Copyright. Avail: CFSTI CSCL 06K

The 20-kW xenon compact arc lamp used as the energy source for the simulated solar system in the 25-ft space simulator has an internal pressure of approximately 4.2 atm (47 psig) at room temperature; at operating temperature, its pressure increases to approximately 10 atm (132 psig). For this reason, safety equipment must be supplied for the men who work around these lamps. Several tests were conducted on protective clothing exposed to the breaking of quartz envelopes identical to those used

in the manufacture of compact xenon arc lamps. Quartz envelopes and two pyrex tubes similar to the lamps were broken at 45 psig. Articles of protective clothing and different types of materials were exposed to the lamp and then inspected for marks and cuts. After modification, the test was repeated with very encouraging results. A verification test of face shield and leather gloves was performed to prove safety with a more direct explosion impact. Other tests were run to evaluate different methods of approach for personnel protection and to establish safety requirements for the 5-kW arc lamp.

Author

N69-35135*# Chicago Univ., III.

INVESTIGATION IN SPACE-RELATED MOLECULAR BIOLOGY INCLUDING CONSIDERATIONS OF THE MOLECULAR ORGANIZATION IN LUSTER SOUNDING ROCKET PROGRAM Progress Report, 1 Jan. 1968-31 Aug. 1969

Humberto Fernandez-Moran 31 Aug. 1969 226 p refs (Grant NGL-14-001-012) Avail: CFSTI CSCL 06C

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- 2. ELECTRON MICROSCOPY OF DNA CONFORMATIONS IN SPINACH CHLOROPLASTS C. L. F. Woodcock and H. Fernandez-Moran 9 p refs (See N69-35137 20-04)
- 3. ULTRASTRUCTURE AND VARIABLE APERTURE PORE FUNCTION OF HEXAGONAL SUBUNITS IN PLASMA MEMBRANES R. D. Schultz, S. K. Asunmaa, and F. D. Kleist (McDonnell-Douglas Astron. Co., Newport Beach, Calif.) 36 p refs (See N69-35138 20-04)
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- 5. HIGH RESOLUTION ELECTRON MICROSCOPY APPLIED TO THE STUDY OF NERVE MEMBRANES H. Fernandez-Moran 10 p refs (See N69-35140 20-04)
- 6. ELECTRON MICROSCOPY OF A HEMAGGLUTININ FROM LIMULUS POLYPHEMUS H. Fernandez-Moran, J. J. Marchalonis, and G. M. Edelman 6 p refs (See N69-35141 20-04)
- 7. THE ELECTRON MICROSCOPE. PART 1: TOWARD THE CENTER OF LIFE H. Fernandez-Moran 3 p (See N69-35142 20-04)
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- 10. THE WORLD OF INNER SPACE H. Fernandez-Moran 12 p (See N69-35145 20-04)

N69-35136*# Chicago Univ., III.

RESEARCH AND TRAINING PROGRAM IN SPACE-MOLECULAR BIOLOGY CONDUCTED AT FACILITIES FOR HIGH RESOLUTION ELECTRON MICROSCOPY

In its Invest. in Space-Related Mol. Biol. Including Considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 95 p refs (See N69-35135 20-04)

Avail: CFSTI CSCL 06C

Significant developments in a research and training program in space-molecular biology, carried out with high resolution electron microscopy, are reported. Specific topics include continued

investigation of (1) particles obtained from the Luster Sounding Rocket Experiment and techniques for nondestructive analysis of extraterrestrial matter; (2) high-resolution electron-optical information storage and retrieval, including methods for ultraminiaturization and information storage and retrieval at the molecular and near-atomic level and instrumentation for a portable retrieval system adaptable to lunar and planetary missions; (3) cryo- and high voltage electron microscopy with superconducting lenses and closed-cycle liquid helium refrigerator; (4) electron microscopy of DNA conformations associated with chloroplast membranes; (5) RNA polymerase to determine its role in the differential RNA transcription upon DNA templates; and (6) organized water as an integral structural component of biological systems.

N69-35137*# Chicago Univ., III.

ELECTRON MICROSCOPY OF DNA CONFORMATIONS IN SPINACH CHLOROPLASTS

C. L. F. Woodcock and H. Fernandez-Moran *In its* Invest. in Space-Related Mol. Biol. Including Considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 9 p refs Repr. from J. Mol. Biol., no. 31, 1968 p 627–631 (See N69-35135 20-04)

Avail: CFSTI CSCL 06C

The successful application of techniques for the isolation and purification of spinach leaf chloroplasts on a microscale is reported. This has enabled visualization by electron microscopy of the DNA associated with each chloroplast, following disruption by osmotic shock. DNA molecules extracted from purified chloroplasts were also analyzed. Examination of these preparations under controlled experimental conditions consistently revealed two major DNA conformations and a characteristic association with the chloroplast membrane system.

N69-35138*# McDonnell-Douglas Astronautics Co., Newport Beach, Calif. Western Div.

ULTRASTRUCTURE AND VARIABLE APERTURE PORE FUNCTION OF HEXAGONAL SUBUNITS IN PLASMA MEMBRANES

R. D. Schultz, S. K. Asunmaa, and F. D. Kleist *In Chicago Univ.* Invest. in Space-Related Mol. Biol. Including Considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 36 p refs Presented at the 2nd Intern. Meeting Intern. Soc. for Neurochem., Milan, 1 – 5 Sep. 1969 (See N69-35135 20-04) (Douglas Paper-10246) Avail: CFSTI CSCL 06A

High resolution electron micrographs revealed arrays of hexagonal subunits, ≈ 90-95 Å diameter, in a black lipid membrane of the type in which nerve-like electrical activity was induced by addition of the circular polypeptide antibiotic, alamethicin. The subunits appear to be related to those reported in junctional sites where adjacent membranes of living cells are known to be in electrical contact. Molecular models of the subunits strongly suggest that they act, in association with absorbed allosteric proteins, as variable aperture pores in the cellular membrane. The arrangement and movement of cholesterol molecules in these models resemble those of the leaves of a between-the-lens shutter of a modern camera. The possible roles of the hexagonal subunits in ion-gating, nerve conduction, sensory reception and active transport are discussed in some detail. Ordered water, whose properties have recently been characterized by this laboratory, is an important structural component of the hexagonal subunit.

N69-35139*# McDonnell-Douglas Astronautics Co., Newport Beach, Calif. Western Div.

CHARACTERIZATION OF ORDERED WATER IN HYDROPHILIC MEMBRANE PORES

R. D. Schultz, S. K. Asunmaa, G. A. Guter, and F. E. Littman *In* Chicago Univ. Invest. in Space-Related Mol. Biol. including considerations of the Mol. Organ. in Luster Sounding Rocket

Program 31 Aug. 1969 26 p refs Presented at the 2nd Intern. Meeting Intern. Soc. for Neurochem., Milan, 1-5 Sep. 1969 (See N69-35135 20-04)

(Douglas Paper-10247) Avail: CFSTI CSCL 06A

Ordered water, whose presence in biological membranes is often postulated, was characterized in cellulose acetate and porous glass desalination membranes. Above a certain critical diameter, each membrane pore was lined with a 22 Å thick hydration sheath of highly hydrogen-bonded water in which salt is essentially insoluble. A pore with an ideal critical diameter of 44 Å was almost entirely filled with ordered water whose average viscosity is 0.36 poise, almost 39 times greater than that of ordinary water at 23°C. The simple assumption of approximate equality between hydration sheath thickness and the average diameter of a flickering cluster permitted a rate process calculation of the permeation of salt-free ordered water through an ideal desalination membrane in good agreement with experimental data. The aqueous cylinders in the liquid-crystalline hexagonal phase of a brain phospholipid-water system are mainly ordered-water stabilized by the polar ends of the phospholipid molecules. The insolubility of salt in the ordered water indicates a high electrical resistivity.

N69-35140*# Chicago Univ., III.

HIGH RESOLUTION ELECTRON MICROSCOPY APPLIED TO THE STUDY OF NERVE MEMBRANES

H. Fernandez-Moran *In its* Invest. in Space-Related Mol. Biol. including considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 10 p refs (See N69-35135 20-04)

Avail: CFSTI CSCL 06A

A research program is described which includes studies into the following related problems of nerve membrane ultrastructure that are particularly suitable for correlated electron microscopic investigations:(1) elucidation of multienzyme and other macromolecular components closely associated with cell membranes, for carrying out energy and information transduction functions; and (2) study of the association of nucleic acids and the protein synthetic machinery with cell membranes to gain a better understanding of membrane biosynthesis, including study of DNA and RNA conformations associated with membranes in chloroplasts, mitochondria, and in nerve cells, and study of RNA polymerase and its participation in the differential RNA transcription upon DNA templates.

N69-35141*# Chicago Univ., III.

ELECTRON MICROSCOPY OF A HEMAGGLUTININ FROM LIMULUS POLYPHEMUS

H. Fernandez Moran, J. J. Marchalonis, and G. M. Edelman *In its* Invest. in Space-Related Mol. Biol. Including Considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 6 p. refs. Repr. from J. Mol. Biol., no. 32, 1968 p. 467—469 (See N69-35135 20-04)

Avail: CFSTI CSCL 06A

Electron microscopic evidence that the ring structures previously observed correspond to Limulus hemagglutinin, and additional details of its structure are presented. These studies were designed to provide optimum conditions for consistent attainment of high resolution. The microscopes were provided with a highly regulated power supply (50 kw motor generator set, equipped with a new solid-state regulator giving better than 0.1% voltage stability and very low harmonic distortion). A Siemens Elmiskop 1 and Elmiskop 1A, and a Hitachi 11B microscope were used, operating mainly at 75, 80 and 100 kv. All microscopes were provided with improved pointed filaments of single-crystal tungsten with a tip radius of 1 to 10 μ , in special guns of the thin-film molybdenum cap type.

N69-35142*# Chicago Univ., III.

THE ELECTRON MICROSCOPE. FART 1: TOWARD THE CENTER OF LIFE

Humberto Fernandez-Moran *In its* Invest. in Space-Related Mol. Biol. Including Considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 3 p (See N69-35135 20-04) Avail: CFSTI CSCL 06C

Advances in instrumentation and techniques in electron microscopy, as applicable to the study of biological ultrastructure, are reported. Of particular importance in the new methodology is the use of a diamond knife that is operated in an evacuated microtome at cryogenic temperatures to minimize rearrangement of the molecules in biological specimens. The results have been the viewing of deoxyribonucleic acid (DNA) molecules, including the transfer of information from DNA to the building centers of cells by ribonucleic acid (RNA). The primary goal of viewing the DNA molecular structure directly is also mentioned, which requires specimens in the domain of 1 to 2A.

A.C.R.

N69-35143*# Chicago Univ., III.

ELECTRON MICROSCOPE. PART 2: BIG FUTURE FOR DEMAGNIFICATION

Humberto Fernandez-Moran *In its* Invest. in Space-Related Mol. Biol. Including Considrations of the Mol. Organ. In Luster Sounding Rocket Program 31 Aug. 1969 2 p (See N69-35135 20-04) Avail: CFSTI CSCL 06C

The application of electron microscopy to studies of human perception and the development of prosthetic sensors is briefly treated. By demagnification, information can be stored and retrieved, where the size of letters of a page are only about 100 atoms high. Further research could lead to the use of electron microscopic potential in miniaturized computers. Additionally, this instrumentation can enable duplication of the memory portion of the brain when used along with holographic techniques. As a final application, the electron microscope shows potential for gaining information on the atomic structure and organization of space.

A.C.R.

N69-35144*# Chicago Univ., III.

HUMANITY AND SCIENCE AT THE CROSSROADS

Humberto Fernandez-Moran *In its* Invest. in Space-Related Mol. Biol. Including Considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 8 p (See N69-35135 20-04) Avail: CFSTI CSCL 06J

The spirit of individual innovation and the cooperative endeavors of human minds are emphasized as the key factors in guiding science and technology to higher levels of achievement. The need for social and geopolitical cooperation between North and South American nations is also cited; the United States primarily requires natural resources and markets, while Latin America needs technical, scientific, and managerial assistance. A brief approach to such cooperative endeavors is outlined, as well as several of the great problems of Latin America.

A.C.R.

N69-35145*# Chicago Univ., III. THE WORLD OF INNER SPACE

Humberto Fernandez-Moran *In its* Invest. in Space-Related Mol. Biol. including considerations of the Mol. Organ. in Luster Sounding Rocket Program 31 Aug. 1969 12 p (See N69-35135 20-04) Avail: CFSTI CSCL 04B

The potential uses of electron microscopy, as well as the basic principles of the technique, are treated. Improvements required for successful application of the instrument to studies of molecular and atomic structure are identified in three major areas: (1) operational environment: (2) instrumentation, and (3) preparation methods. Another primary goal of achieving a coherent electron beam, which would improve basic resolution and enable high resolution holography through utilizing superconducting lenses, is also treated. Finally, demagnifying techniques and use of the diamond knife to allow quantitative predictions concerning the behavior of biological matter are covered. Specific emphasis is placed on potential studies into the nature of deoxyribonucleic (DNA).

A.C.R.

N69-35185# Defense Documentation Center, Alexandria, Va. RESPIRATORY EFFECTS OF SPACE TRAVEL, VOLUME 1 May 1969 107 p refs

(AD-686900; DDC-TAS-69-29-1) Avail: CFSTI CSCL 6/16

This bibliography is a collection of 72 unclassified and unlimited references on respiration during space travel received by DDC from March, 1953 to December, 1968. The bibliography contains references and abstracts on such subjects as anoxia, hypoxia, weightlessness, variable concentration atmospheres, physiological effects and tolerances -- all with respect to respiration in space. Indexes by Corporate Author/Monitoring Agency, Subject, and Personal Author are given. Volume 2(AD-852 001) of this bibliography, which is a limited version, combines the limited references with all of the references in this unlimited volume, Volume I.

N69-35258# Defence Research Board, Ottawa (Ontario). Defence Scientific Information Service.

INFLUENCE OF TEMPERATURE ON CARRIER PIGEON HOMING ABILITY AND DEMONSTRATION OF AN UNKNOWN EFFECT

Gustav Kramer et al Apr. 1969 32 p refs Transl. into ENGLISH from German Periodical (T-120-G) Avail: CFSTI

CONTENTS:

- 1. INFLUENCE OF TEMPERATURE AND EXPERIENCE ON HOMING ABILITY OF CARRIER PIGEONS G. Kramer p 1 -- 5 (See N69-35259 20-04)
- 2. FURTHER EXPERIMENTS ON "WINTER EFFECT" IN CARRIER PIGEONS' HOMING ABILITY G. Kramer et al p 6 22 refs (See N69-35260 20-04)
- 3. SHORT-DISTANCE HOMING OF CAGE-PIGEONS G. Kramer et al p 23 27 refs (See N69-35261 20-04)

N69-35259# Defence Research Board, Ottawa (Ontario). Defence Scientific Information Service.

INFLUENCE OF TEMPERATURE AND EXPERIENCE ON HOMING ABILITY OF CARRIER PIGEONS

Gustav Kramer *In its* Influence of Temp. on Carrier Pigeon Homing Ability and Demonstration of an Unknown Effect Apr. 1969 p 1-5 Transl. into ENGLISH from J. Ornithol., no. 95, 1954 p 343-347 (See N69-35258 20-04) Avail: CFSTI

The homing ability of pigeons in different seasons of the year for three flight courses is reported, as well as the criteria for the homing instinct. The reduced homing capability in winter is discussed along with the straying bird problem. Experimental homing results are listed in tabular form.

J.A.M.

N69-35260# Defence Research Board, Ottawa (Ontario). Defense Scientific Information Service.

FURTHER EXPERIMENTS ON "WINTER EFFECT" IN CARRIER PIGEONS' HOMING ABILITY

Gustav Kramer et al $In\ its$ Influence of Temp. on Carrier Pigeon Homing Ability and Demonstration of an Unknown Effect Apr. 1969 p 6–22 refs Transl. into ENGLISH from J. Ornithol., no. 97, 1956 p 353–370 (See N69-35258 20-04) Avail: CFSTI

The homing ability of inexperienced carrier piegeons during the winter is discussed. The experimental results are presented in terms of the number of birds going astray and the homing times. The main flight course used was from Hohenkirchen to Wilhelmshaven (22 km). The mechanism of orientation and the reason for reduced homing instinct in winter are presented as unknown.

J.A.M.

N69-35261# Defence Research Board, Ottawa (Ontario). Defence Scientific Information Service.

SHORT-DISTANCE HOMING OF CAGE-PIGEONS

Gustav Kramer et al *In its* Influence of Temp. on Carrier Pigeon Homing Ability and Demonstration of an Unknown Effect Apr. 1969 p 23–27 refs Transl. into ENGLISH from J. Ornithol., No. 97, 1956 p 371–376 (See N69-35258 20-04) Avail: CFSTI

Experimental results of releasing caged birds for the first time and evaluating the homing capability are presented. The homing method is discussed as being unknown. A comparison is drawn between the homing ability of caged birds and control pigeons.

J.A.M.

N69-35268# Stanford Linear Accelerator Center, Calif. FORMAL DESCRIPTION FOR TWO-DIMENSIONAL PATTERNS

C. T. Zahn Mar. 1969 8 p refs Presented at Intern. Joint Conf. on Artificial Intelligence, Washington, D.C., 7-9 May 1969 Sponsored by AEC

(SLAC-PUB-538; CONF-690511-1) Avail: CFSTI

A structural description for two-dimensional black and white patterns is defined as the set of contour lines for an appropriate function which fits the binary pattern. These contour lines are mutually non-intersecting closed polygonal curves with edges in only eight different directions and they represent the boundaries between connected black and white areas of the pattern. Rigorous procedures are described to transform a matrix pattern into a structural description and vice versa. Advantages of this method for describing patterns previous to pattern recognition are discussed at some length.

Author (NSA)

N69-35333# Atomic Energy Commission Research Establishment. Riso (Denmark).

MICROBIOLOGICAL CONTROL OF RADIATION STERILIZATION OF MEDICAL SUPPLIES. PART 1: TOTAL COUNT ON MEDICAL PRODUCTS (DISPOSABLE SYRINGES AND DONOR SETS) PRIOR TO RADIATION STERILIZATION

Ebbe Ahrensburg Christensen, S. Mukherji, and Niels W. Holm Aug. 1968 24 p refs

(Contract IAEA-473/RB)

(RISO-122) Avail: CFSTI

A technique for the determination of the number of microorganisms on dry disposable equipment, e.g. hypodermic syringes and donor sets from different producers, is described. The equipment was flushed, the flushing liquid filtered and the filter placed on agar. The method of counting and subsequent sterilization by irradiation is described.

Author (ESRO)

N69-35356# Environmental Data Service, Silver Spring, Md.
SOME INVESTIGATION RESULTS AT VNIGL (VALDAY
HYDROLOGIC SCIENTIFIC RESEARCH LABORATORY OF
THE STATE HYDROLOGICAL INSTITUTE) PROVING
GROUNDS FOR PRECIPITATION GAGES [NEKEOTORE
RECULTATY ISSLEDOVANII NA OSADKOMERNOM
POLIGONE VNIGL]

V. S. Golubev Mar. 1969 27 p refs Transl. into ENGLISH from Tr. Gos. Gidrologicheskii Inst. (USSR), no. 123, 1965 p 81-95

(PB-183143T; WB-T-113) Avail: CFSTI CSCL 14B

The problem of computing atmospheric precipitation correctly with various precipitation gages has been repeatedly examined in recent literature and at special conferences where it was noted that both the solid and liquid precipitation were as a rule under calculated. The deficiency value depends on the type of instrument,

its location site, the characteristics of precipitation, and type as well as upon meteorological conditions (wind speed, temperature, humidity, etc.). The program of investigations was divided into the following groups: (1) investigation of the wind field of the area of operation; (2) investigation of uniformity of precipitation upon the area of operation; (3) investigation of deficiency in precipitation recordings by precipitation gages caused by the effect of wind, wetting and evaporation.

Author (USGRDR)

N69-35414*# Midwest Research Inst., Kansas City, Mo.
APPLICATION OF AEROSPACE-GENERATED
TECHNOLOGY TO WATER POLLUTION AND OTHER
PUBLIC SECTOR PROBLEMS Quarterly Report 1 Dec.
1968-28 Feb. 1969

David Bendersky, Andrew J. Winfrey, and Edward T. Fago 14 Mar. 1969 23 p

(Contract NSR-26-002-083; MRI Proj. 3217-E(B-C)) (NASA-CR-104196; QR-3) Avail: CFSTI CSCL 061

This study aims to apply aerospace-generated technology to a minimum of 12 specific water pollution problems that have a high potential for being solved by such techniques. In this report, 22 problems are specified. An initial screening indicated that the following four problems represent good possibilities for application: (1) methods, techniques, and equipment for aerial surveillance of water quality: (2) sensor system for detecting radiological emissions in streams or impoundments at remote locations; (3) a simplified, inexpensive method for detecting radium 226 in bodies of water; and (4) laser applications for laboratory analysis of water pollution. The remaining problems involve detection and effects of oil in water, analyses of water properties and composition, efficiency of waste treatment, and the growth of algae and other organisms in water.

K.W.

N69-35449# Michigan Univ., Ann Arbor. Logic of Computers Group.

FORMALISMS FOR LIVING SYSTEMS, PART 1

Richard A. Laing Mar. 1969 99 p refs

(Contracts DA-31-124-ARO(D)-483; N00014-67-A-0181; Grant NIH GM-12236-03)

(AD-687382; Rept-08226-8-T; AROD-6499.10-M) Avail: CFSTI CSCL 6/4

Various formalisms for expressing the structure and behavior of biological systems are proposed and discussed. The formalisms include tiling or domino systems, the von Neumann cellular automaton system, and several systems based on the monogenic normal systems Tag and Lag. There is some discussion of desirable characteristics of models for biological theory.

Author (TAB)

N69-35465*# New Mexico State Univ., Las Cruces. Dept. of Biology.

MICROORGANISM STUDY, DESERT FUNGI Final Technical Report

E. E. Staffeldt 10 Jul. 1969 10 p refs Prepared for JPL (Contracts NAS7-100; JPL-951602)

(NASA-CR-105305) Avail: CFSTI CSCL 06C

Fungal isolates were extracted from soils removed under desert conditions in Chile, Egypt, Oregon, Wyoming, Hawaii and White Mountain of California. These organisms were transferred to Czapek's and carrot decoction agars to facilitate identification. Complete fungal description charts have been submitted on the isolates including order, family, genus, species, colony characteristics, and sexual or asexual reproductive aspects.

Author

N69-35527*# Techtran Corp., Glen Burnie, Md. DIURETIC EFFECT OF WATERMELON, PART 2

T. Isawa et al Washington NASA Aug. 1969 3 p Transl. into ENGLISH from Japan. J. Med. Sci. Biol. (Tokyo), Sect. 8, v. 5, 1939 p 209 -- 210

(Contract NASw-1695)

(NASA-TT-F-12505) Avail: CESTL CSCL 06P

Citrulline and arginine fractions were isolated as the diuretically effective agents in watermelons, and the mechanism of these fractions was tested in animals intoxicated with chloroform, CCl₄ and phosphories. Along with the influence of the citrulline fraction, toward the encouragement of urea formation, there is a secondary effect, an ammonia stimulating influence in the blood. Thus the authors were able to apply the citrulline fraction to lower a dangerously increasing blood-ammonia level.

N69-35540*# McDonnell-Douglas Co., Huntington Beach, Calif.
REQUIREMENTS STUDY FOR A BIOTECHNOLOGY
LABORATORY FOR MANNED EARTH ORIBTING MISSIONS.
VOLUME 2: SUMMARY OF INDIVIDUAL EXPERIMENTS
REQUIREMENTS

L. T. Kail Washington NASA Aug. 1969 205 p refs (Contract NAS7-518)

(NASA-CR-1409; DAC-58156) Avail: CFSTI CSCL 06S

This volume summarizes the requirements of each experiment used in establishing the biotechnology requirements described in Volume I of this report. The requirements for each experiment are presented in four sections: (1) biomedical and human research; (2) behavioral research; (3) bioscience research; and (4) life support and protective systems. The experiment title, category, and assigned number relate directly to the research program discussed in Volume 1, Section 2.

N69-35541*# McDonnell-Douglas Co., Huntington Beach, Calif.
REQUIREMENTS STUDY FOR A BIOTECHNOLOGY
LABORATORY FOR MANNED EARTH ORBITING MISSIONS.
VOLUME 1: RESULTS, RECOMMENDATIONS AND
REQUIREMENTS

L. T. Kail Washington NASA Aug. 1969 169 p (Contract NAS7-518)

(NASA-CR-1408; DAC-58155) Avail: CFSTI CSCL 06S

The objective of the study presented here was to expand and incorporate the results of past studies, into an all-encompassing life science research program (gap-filling as required) to identify manned Earth-orbital life science laboratory equipment requirements for the 1970's. Another objective of the study was to identify and integrate requirements that are common to the four life science research fields of biomedicine and human research, behavior, bioscience, and life support systems. An elementary sketch of a concept for a biotechnology laboratory as part of a multipurpose. space station is shown. The individual equipment items required in the "laboratory area" are described. The centrifuge shown relates to requirements of experiments considered in this report and represents another program currently under study by NASA for life sciences research. This study has addressed itself to the total research activities and equipment encompassed by such a laboratory. The results of the study provide a basis for further definition of Author a facility.

N69-35548*# Techtran Corp., Glen Burnie, Md.

RESEARCH ON THE SCATTERING OF LIGHT IN THE HUMAN EYE [RECHERCHES SUR LA DIFFUSION DE LA LUMIERE DANS L'OEIL HUMAIN]

Yves le Grand Washington NASA Aug. 1969 28 p. refs Transl. into ENGLISH from Rev. Opt. (Paris), v. 16, no. 8, 1937 p. 241 – 266

(Contract NASw-1695)

(NASA-TT-F-12344) Avail: CFSTL CSCL 06P

An experimental study was made with 3 subjects to determine light flux scattered in the human retina. The findings are explained by a 3.5% retinal flux. Scattering increases sharply during the first few minutes of adaptation to darkness.

N69-35588 Arbeitsgruppe Biophysikalische Raumforschung, Frankfurt am Main (West Germany).

PROBLEMS OF ESTIMATING BIOLOGICAL RADIATION DOSES AND RADIATION PROTECTION IN SPACE

H. Bücker and W. Völker /n CERTS Determination of Radiation Doses in Space 1968 p 195-206 refs (See N69-35576 20-29)

Copyright Avail: Issuing Activity

A discussion of radiation hazards and radiation protection in manned space operations requires considerations quite different from those that would apply to occupational exposure under terrestrial conditions. The recommendations concerning radiation protection on earth avoid exact determinations of the biological radiation doses by defining the maximum permissible doses under worst conditions, and a large safety factor is involved. This approximation is not acceptable for radiation protection in manned space flight for it does not lead to optimal safety of the entire mission, for by enlarged dead-weight-shielding other risks could be increased. For this reason in manned space flight radiation hazards ought to be estimated as exactly as possible. Some space radiations which might be biologically important have unknown physical parameters and the biological efficiency of other radiations, which are being gated, is still unknown. Therefore, radiation dosimetry and radiation protection in space require exact analyses of the three components of space radiation particularly their physical parameters and their biological effects. The radiation dose in a space ship and in the body of the astronaut depends mainly on secondary radiation and bremsstrahlung produced in the absorber. Because of the most complex conditions a calculation of the dose based on the data of the incident beam is not possible and this problem is discussed. Author (ESRO)

N69-35608# National Inst. of Radiological Sciences, Chiba (Japan).

[RADIOLOGICAL SCIENCES] Annual Report

Oct. 1968 111 p refs

(NIRS-7; AR-7) Avail: AEC Depository Libraries

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N69-35609# National Inst. of Radiological Sciences, Chiba (Japan).

PHYSICS

In its Radiol. Sci. Oct. 1968 p 1-11 refs (See N69-35608 20-04)

Avail: AEC Depository Libraries

Research in physics at the National Institute of Radiological Sciences during 1967 is reported. The research includes a new detection method of small ionization current based on oscillation of a dynamic capacitor, measurement of plutonium lung burden in vivo, high-sensitivity continuous plutonium air monitor, experimental

determination of energy spectrum of megavolt x rays, neutrons from thick-target beryllium (d,n) reactions at 1.0 to 3.0 MeV, attenuation of high energy x rays, energy dependence of LiF, CaF $_2$, and CaSO $_4$ (Mn) thermoluminescent dosimeters for high-energy electrons, estimation of gamma dose from neutron-induced radioactivity in Hiroshima and Nagasaki, and fast neutron dose distribution in tissue-equivalent phantom. Author (NSA)

N69-35611# National Inst. of Radiological Sciences, Chiba (Japan).

BIOLOGICAL STUDIES

In its Radiol. Sci. Oct. 1968 p 21-35 refs (See N69-35608 20-04)

Avail: AEC Depository Libraries

Research was conducted on the effects of irradiation on animal and human cells. Separate reports are presented in physiology, biochemistry and biophysics, genetics, cytology and morphology, medical studies, and environmental studies. The reports in physiology are concerned with whole body recovery, rate of spermatogenesis, hematopoietic cells and tissue, cell proliferation in the intestinal epithelium. DNA synthesis, nuclear RNA polymerase, and thrombocyte. The biophysical and biochemical reports are concerned with molecular degradation in cells, especially DNA, ATP, and enzymes. Genetic studies are concerned with lethal chromosomes and mutants. Analyses of radioactive isotopic metabolism in man are presented along with methods for dosage calculation and tracer techniques. Environmental studies on whole body retention of radiation are also presented.

N69-35614*# National Aeronautics and Space Administration. Washington, D.C.

RESPIRATORY TESTS IN DYNAMIC HYPERTHERMIA DUE TO INGESTION OF PROTEIN [RESPIRATIONSVERSUCHE BEI DYNAMISCHER EIWEISSHYPERTHERMIE]

H. Rietschel et al. Sep. 1969 12 p. refs. Transl. into ENGLISH from Arch. Exp. Pathol. Pharmakol. (Berlin), v. 121, 1927 p. 332 – 341 (NASA-TT-F-12509) Avail: CFSTI CSCL 06P

Protein feeding experiments in a respiratory apparatus were conducted to determine the effects of protein ingestion on body temperature, in both adults and infants. The rise in temperature after ingestion of large quantities of proteins is considered to be a form of hyperthermia. It is concluded that the administration of protein in a liquid-restricted diet results in a more pronounced heat production than in diets with adequate liquids, and since the body can dissipate only small quantities of heat, hyperthermia develops. Tables of basal metabolism rate, and temperature during restriction of liquids with protein feeding are included.

N69-35634*# National Aeronautics and Space Administration, Washington, D.C.

ON THE QUESTION OF BLASTOPORE CLOSURE IN RANA FUSCA

M. Moszkowski · Aug. Transl. into ENGLISH from Arch. Mikroskopsiche Anatomie, v. 60, 1902 p 407 –413 (NASA-TT-F-12508) Avail: CFSTI CSCL 06C

Mechanisms of egg yolk-sac rupture and blastopore formation are described. Observations show that the ruptures are connected with the resistance power of the outer layers of the egg and represent the first step in the development of extraovates.

N69-35635*# National Aeronautics and Space Administration, Washington, D.C.

TWO CASES OF POTOMANIA [DEUX OBSERVATIONS DE POTOMANES]

M. Labbe et al Aug. 1969 13 p refs Transl. into ENGLISH from Bull. Soc. Med. Hop., Paris, v. 55, 1931 p 1072 – 1078 (NASA-TT-F-12500) Avail: CFSTI CSCL 06P

Case histories of two female individuals suffering from alimentary disorders of psychogenic origin are considered. Arguing from the point of view of complex mental processes and demonstrable behavioral aberration, the purpose of this report is to discredit the easy diagnosis of diabetus insipidus or azotic diabetus and too ready treatment of similar cases by pharmaceutical means. Symptoms of potomania, polyuria, and phagomania, and the routine of deception in the habits of these patients to satisfy their urgings are reported. Hospital treatment by isolation, strict supervision of water and solid intake, and general metabolic surveillance succeeded in persuading the patients temporarily in the effective control of their conditions. General discussion of the cases emphasizes the difficulties of differential diagnosis and treatment of the obsession underlying both potomania and phagomania.

N69-35637*# National Aeronautics and Space Administration, Washington, D.C.

THIRST AFTER BLEEDING [LA SOIF APRES LA SAIGNEE]
Brocq-Rousseau et al Sep. 1969 10 p refs Transl. into
ENGLISH from Sang (Paris), v. 3, 1929 p 44 –50
(NASA-TT-F-12511) Avail: CFSTI CSCL 06P

Experiments with thirst in horses after drawing blood, at the rate of 6000 ml weekly, were conducted for a year. Water intake was measured on days of bleeding and days of nonbleeding. Averages of water intake by individual animal are tabulated. It is concluded that animals drink more than normal after bleeding. F.O.S.

N69-35638# Joint Publications Research Service, Washington, D.C.

RADIOBIOLOGY, VOLUME 8, NO. 2 [RADIOBIOLOGIYA, TOM 8, VYPUSK 2]

Oak Ridge, Tenn. AEC 1968 272 p refs Transl into ENGLISH from Radiobiologiya (Moscow), v. 8, no. 2, 1968 p 179 – 328 Sponsored by AEC

(AEC-TR-6915-Vol-8-no-2) Avail: CFSTI

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- 17. COMPARATIVE STUDY OF THE INTRACELLULAR DISTRICUTION OF 35 S-CYSTAMINE IN THE LIVERS AND SPLEENS OF WHITE MICE AND RATS V. G. Vladimirov p $^{130}-^{136}$ refs
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- 28. INFLUENCE OF RADIOPROTECTORS ON THE PROCESSES OF BLOOD CLOTTING DURING ACUTE RADIATION SICKNESS IN GUINEA PIGS O. Ya. Vorob'ev p 220 226 refs
- 29. RADIOSENSITIVITY OF CERTAIN SPECIES OF WOODY PLANTS UNDER THE CONDITIONS OF BELORUSSIA M. A. Kudinov p 227–230 refs
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- 34. BIOLOGICAL EFFECTS OF IRRADIATION OF VARIOUS INTENSITIES I. G. Akoev et al p 253-256 (See N69-35641 20-04)

N69-35639# Joint Publications Research Service, Washington, D.C.

INFLUENCE OF HOT PARTICLES ON HUMAN CELLS

S. I. Tarasov et al. In its Radiobiol., vol. 8, no. 2 $\,$ 1968 $\,$ p $\,$ 53 – 61 refs (See N69-35638 20-04) Avail: CFSTI

A culture of embryonic cells (fibroblasts) was used to study the biological hazards of particles with high absolute radioactivity, of the order of 10^{-11} – 10^{-8} Ci, and the penetration and prolonged fixation of these hot particles into human lungs. The model was created by irradiating a specially prepared metallic powder of stable cobalt with a flux of neutrons. The absolute activity of each of the cobalt 60 particles obtained was 10 -9 Ci. One of the most complex problems in formulating the experiment proved to be a search for a method for fixation of the microscopic cobalt particles in the growth zone of the cells. A laser apparatus was ultimately successful. The biological effects established were an inhibition of mitosis and an increase in the frequency of chromosome rearrangements. Further experiments were recommended to study the duration of delay of mitosis and the death of cells, as well as the correlation between biological effects and absorbed doses. A.C.R.

N69-35641# Joint Publications Research Service, Washington, D.C.

BIOLOGICAL EFFECTS OF IRRADIATION OF VARIOUS INTENSITIES

I. G. Akoev et al *In its* Radiobiol., vol. 8, no. 2 1968 p 253 – 256 (See N69-35638 20-04)
 Avail: CFSTI

The clinical course of radiation sickness in dogs subjected to gamma irradiation at various intensities was studied. Dose rates from 0.1 to 894 R/min were used, or the dose was split into two to ten fractions. Special attention was paid to clinical expression of general primary response manifestations and the height period of the disease. The expression of primary responses varied more substantially than the general severity of radiation sickness, and the results of observations for fractionated irradiation proved particularly unexpected. The degree of expression of primary responses under these conditions increased with each fraction of irradiation only up to a definite dose level. Further irradiation resulted in weakening or disappearance of primary response manifestations.

A.C.R.

N69-35654* Mational Aeronautics and Space Administration, Washington, D.C.

AMERICA IN SPACE: THE FIRST DECADE. LINKING MAN AND SPACECRAFT

William R. Corliss 1 Oct. 1968 20 p refs

(NASA-EP-56) Avail: SOD \$0.40; CFSTI CSCL 05H

Methods, systems, equipment, and facilities used by NASA for transferring information between spacecraft and the earth are described. This includes summaries of the man-machine communication system from spacecraft sensors to the final user of the data; power sources and transmission problems; use of bits, codes, and communication languages; real-time and delayed-time transmissions; data acquisition; NASA control centers; and data processing and evaluation on the ground.

K.W.

N69-35685*# National Aeronautics and Space Administration, Washington, D.C.

DIPSOMANIA AND POTOMANIA [DIPSOMANIE ET POTOMANIE]

R. Boulin et al Aug. 1969 7 p Transl. into ENGLISH from Prat. Med. Franc. (Paris), no. 11, 1930 p 211 – 214 (NASA-TT-F-12504) Avail: CFSTI CSCL 06P

The psychophysiological changes in the desire to drink which are reflected in clinical syndromes known as potomania and dipsomania are investigated. The main sympton of potomania is shown to be the continuous desire to drink abnormal quantities of liquid regardless of the nature of the liquid ingested. Dipsomania is distinguished from the former by its periodic and paroxysmal character. However, the distinguishing features between drunkenness and dipsomania are not always distinct since an acquired form exists resulting from habitual abnormal ingestion. Dipsomania is characterized by the appearance of periodic episodes of polydipsia, between which the desire to drink is normal. The successive development of episodes of dipsomania were found for definite hysteria. It is concluded that without a careful search for pituitary symptoms and signs characteristic of diabetes insipidus, these forms of polyuria may be confused with various types of other polyuria due to changes in the water metabolism.

N69-35705*# Techtran Corp., Glen Burnie, Md.

NON-DESTRUCTIVE DOSAGE OF THE MINERAL COMPOSITION OF BONE TISSUE BY RADIOGRAPH DENSITOMETRY [DOSAGE NON DESTRUCTIF DE LA COMPOSANTE MINERALE DU TISSU OSSEAUX PAR DENSITOMETRIE RADIOGRAPHIQUE]

W. Mouvet Washington NASA Jul. 1969 134 p refs Transl. into ENGLISH from French Dissertation

(Contract NASw-1695)

(NASA-TT-F-12156) Avail: CFSTI CSCL 06R

General definitions and theoretical principles are presented. Formulas are represented for the determination of the attenuation of a bundle of X-rays in passing through a given mass of bone tissue. The various methods of absorption of X-rays passing through a body are described. Formulas for the change in wave length upon absorption are presented. Thompson and Compton diffusion, as well as photoelectric absorption, are included. The law of absorption is described as it applys to polychromatic X-rays. Densitometers of various types are described.

N69-35738# Army Aeromedical Research Unit, Fort Rucker, Ala.
CONTINUOUS EKG RECORDING OF HELICOPTER
INSTRUCTOR PILOTS: AN INTERIM EVALUATION

William P. Shane Apr. 1969 18 p refs

(AD-688857; USAARL-69-5) Avail: CFSTI CSCL 6/16

Fifty-three (53) instructor pilots were studied with one lead of EKG for a full work day. Using Tukeys multiple comparison of means, significant differences were found between heart rates during

flying and heart rates noted while driving, and while performing administrative duties. Means of lowest heart rate recorded and highest heart rate recorded for each subject were reported (means of 71.8 and 140.4 respectively). The activities in which the subjects were engaged at the time is reported. (71.7%) of the subjects engaged in no regular schedules of physical training or sports participation. An 11 x 11 correlation matrix indicates only that subjects who have high heart rates during one activity will have comparably high heart rates during all activities, and vice versa. Four of the 53 subjects showed arrythmias at some time during the recording; one had 38 unifocal ventricular premature contractions during the recording period; three had atrial premature contractions.

N69-35743*# Techtran Corp., Glen Burnie, Md.

LIMITATION OF GROWTH OF BACTERIA IN LIQUIDS [ERGEBNISSE EXPERIMENTELLER POPULATIONSFORSCHUNG]

Oskar Bail Washington NASA Sep. 1969 18 p Transl. into ENGLISH from Z. Immunitaetsforsch. (Stuttgart), v. 60, no. 1/2, 1929 p 1-22

(Contract NASw-1695)

(NASA-TT-F-12480) Avail: CFSTI CSCL 06C

After a general definition of a population and population space, the factors which limit the ultimate density of a bacterial population are discussed. Malthus' theory of population growth is shown to be invalid for mature populations, in which internal and often unidentified factors limit the rate of population increase.

Author

N69-35765*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

CONTRIBUTIONS TO THE PHYSIOLOGY AND PATHOLOGY OF HUMAN URIC ACID METABOLISM. REPORT 1: ON FLUCTUATIONS OF THE ENDOGENIC URIC ACID METABOLISM OF NORMAL PERSONS AND ITS REGULATION [BEITRAEGE ZUR PHYSIOLOGIE UND PATHOLOGIE DES MENSCHLICHEN

HARNSAEURESTOFFWECHELS.1 MITTEILUNG: UEBER SCHWANKUNGEN DES ENDOGEN HARNSAEURES TOFFWECHSELS DES NORMALEN UND DEREN REGULATION]

Hans Lucke Washington NASA Aug. 1969 11 p refs Transl. into ENGLISH from Ges. Exptl. Med. (Heidelberg), v. 56, 1927 p 251-261

(Contract NASw-1692) Avail: CFSTI CSCL 06P

Investigations are performed with the aim of obtaining judgements on nuclein metabolism. Values for uric acid levels are taken from blood and urine in order to determine causes and effects of uric acid fluctuations in the normal individual and to show inferences on the mechanism involved in its functioning.

Author

N69-35786*# Research Triangle Inst., Durham, N.C. Engineering and Environmental Sciences Div.

BIOMEDICAL APPLICATIONS OF NASA SCIENCE AND TECHNOLOGY Final Report, 15 Jun. 1968 – 14 Jun. 1969

14 Jun. 1969 74 p refs (Contract NSR-34-004-056)

(NASA-CR-105423; RTI-EU-411-1) Avail: CFSTI CSCL 06E

During the year, 53 problems were accepted for investigation, 17 technology transfers were accomplished, 24 computerized information searches were performed, and 1 biomedical problem abstract was submitted for dissemination. The types of technology transfers ranged from purely information transfers to devices, instrumentation, and implantable prostheses. NASA-developed fluid

control technology wad adapted to the design and fabrication of a prototype prosthetic urethral valve. Information on ultrasonic nondestructive testing was transferred to a research program in diagnostic ultrasonics. Ferrite pressure transducers developed for measuring pressures in materials used by NASA are being adapted to the measurement of blood flow in the human body. An additional transfer of interest was the application of low-velocity flight balance instrumentation developed in the Soviet space program to monitoring of the flight of birds.

N69-35893*# Naval Aerospace Medical Inst., Pensacola, Ala. ASSESSMENT OF SEMICIRCULAR CANAL FUNCTION. PART 2: INDIVIDUAL DIFFERENCES IN SUBJECTIVE ANGULAR DISPLACEMENT PRODUCED BY TRIANGULAR **WAVEFORMS OF ANGULAR VELOCITY**

Gale G. Owens and Fred E. Guedry, Jr. 17 Jun. 1969 21 p refs Prepared jointly by Navy and Army

(NASA Order R-93)

(NASA-CR-105431; NAMI-1074; USAARL-69-13) Avail: CFSTI CSCL 06P

Development of methods and procedures to provide psychophysical measures of semicircular canal function which have high test-retest reliability and which are practical from the point of view of short arcs of passive whole-body rotation about an earth-vertical axis were accurate when subjects used a psychophysical procedure which involved counterdisplacement of a pointer on a dial. The required retrospective displacement judgments yielded more accurate mean estimates of angular displacement than were obtained in an earlier experiment which probably involved concurrent velocity matching. The differences in response curves in the various conditions of the two experiments clearly illustrate the importance of attention of psychophysical procedures prior to attempting to develop models of the vestibular endorgans to explain differences within a sample of aviation candidates, and the results obtained thus far indicate a high test-retest reliability.

N69-35903*# Mississippi State Univ., State College. Dept. of Microbiology.

INFLUENCE OF METABOLIC ACCUMULATION OF PRODUCTS OF HYDROGENOMONAS CELLS ON THEIR CONTINUED GROWTH, 1 JULY 1964 - 30 JUNE 1969

Robert G. Tischer Jun. 1969 139 p refs (Grant NGR-25-001-004)

(NASA-CR-105393) Avail: CFSTI CSCL 06C

Evaluated are bioregenerative systems of Hydrogenomonas eutropha and Hydrogenomonas thermophilus cells for their utilization of hydrogen in a closed ecological manned space flight environment that uses water electrolysis for producing oxygen. Analyses of the efficiencies of the proposed test organisms, the effects of metabolic wastes on their growths, and the comparative values of Hydrogenomonas and other hydrogen utilizing organisms indicate that neither algal ecologies nor electrolytic-hydrogenomonas systems are acceptable for use in their present state.

N69-35909*# National Aeronautics and Space Administration. Washington, D.C.

MEDICAL AND BIOLOGICAL TESTS ABOARD THE VOSKHOD SPACESHIP [MEDIKO-BIOLOGICHESKIYE ISSLEDOVANIYA NA KOSMICHESKIKH KORABLYAKH TIPA VOSKHOD]

O. G. Gazenko et al Aug. 1969 19 p Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), v. 35, Aug. 1965 p 19 - 26

(NASA-TT-F-12517) Avail: CFSTI CSCL 06S

Preliminary results of some physiological tests conducted during the flights of the Voskhod 1 spaceship and during the Voskhod 2 are discussed. Electrocardiograms, seismocardiograms, pneumograms, electroencephalograms, electrooculograms, blood tests, pulmonary ventilation, vestibular tests, and the hygienic parameters of the spacesuit medium are discussed. No indications of disorders in the basic functional systems of the men were observed and it is concluded that during the flight the cosmonauts maintained adequate physical and operational efficiency.

N69-35923*# Sandia Corp., Albuquerque, N. Mex. Quarantine Dept.

MODEL FOR THE QUANTIFICATION OF THE QUALITATIVE MICROBIAL SAMPLING PROBLEM

A. L. Roark May 1969 16 p refs (NASA Order W-12-853)

(NASA-CR-105394; SC-RR-69-310) Avail: CFSTI CSCL 06C

In information systems design for lunar programs, a mathematical model is described called Probability-of-Identifying-All Model. Its purpose is to estimate the probability that all microorganism species on an Apollo module were identified by the environmental and surface sampling. Here a simple model for this purpose is proposed. It will also provide information which will be useful in establishing sampling protocall. Author

N69-35937*# Univis, Inc., Dudley, Mass. DESIGN, DEVELOPMENT AND PRODUCTION OF PRESSURE SUIT SPECTACLES Final Report

Albert J. Laliberte ed 1 Jul. 1969 56 p (Contract NAS9-8090)

(NASA-CR-101860) Avail: CFSTI CSCL 06K

Spectacles having various attenuative and transmissive characteristics in the ultraviolet, visible, and infrared regions are described. A spectacle frame structure was designed meeting requirement of the anthropometric 95 percentile head and includes a self-adjusting bridge, metal temples with slotted spatula endpieces. and an elastic headband strap. The spectacle front is fabricated from 1/10 12 karat gold filled metal composition. The frames are fitted with plastic lenses, cast from thermosetting CR-39 (ally) digylcol carbonate) resin, and having plano optics. The spectacle assemblies are fabricated in three types, each with a large and a medium bridge. Type 1 has clear lenses attenuating ultraviolet radiation and has visible transmittance in the order of 90%. Type 2, fitted with grey tint lenses, has a visible transmittance of 10% and provides attentuation in the ultraviolet and visible regions. Type 3 has gold-coated bidensity lenses with visible transmittance in the upper gold-coated area of 2% and in the uncoated area of 10%, and provides attenuation in all three regions in the upper lens and in the ultraviolet and visible regions in the bottom lens.

N69-35950# Army Aeromedical Research Unit, Fort Rucker, Ala. SELECTED ANTHROPOMETRIC MEASUREMENTS OF 1640 US ARMY WARRANT OFFICER CANDIDATE FLIGHT TRAINEES

William P. Shane, Delvin E. Littel, Charles G. Moultrie Feb. 1969 76 p refs

(AD-688856; USAARL-69-2) Avail: CFSTI CSCL 5/5

The results of nine anthropometric measurements conducted upon 1,640 U. S. Army warrant officer candidates are presented. The nine measurements were selected as those which contribute most to aircrew workspace design in aircraft. Comparison of these data was performed against similar measurements conducted upon flying personnel in five separate studies by other military services.

Author (TAB)

N69-35962# Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.

EFFECTS OF THE INTENSITY OF AUDITORY AND VISUAL READY-SIGNALS ON SIMPLE REACTION TIME

David L. Kohfield 13 Mar. 1969 15 p refs

(AD-688874; USAMRL-817) Avail: CFSTI CSCL 5/10

The effects of auditory and visual ready-signal intensity were investigated in a simple reaction time (RT) task. Mean RT to three auditory response-signals was found to systematically increase with a corresponding increase in the intensity of either auditory or visual ready-signals. The results were analyzed according to a decision model of stimulus intensity effects. It was concluded that ready-signal intensity influenced the value of the detection criterion. Practice effects and individual differences were also significant determinants of the criterion level.

Author (TAB)

N69-35968# Army Medical Research Lab., Fort Knox, Ky. SKIN LESION THRESHOLD VALUES FOR LASER RADIATION AS COMPARED WITH SAFETY STANDARDS Final Report

Wordie H. Paar 24 Feb. 1969 15 p refs (AD-688871; USAMRL-813) Avail: CFSTI CSCL 6/5

The large amount of skin surface makes this body tissue readily available to accidental and repeated exposures of laser radiation, and most laser safety programs include minimal radiation levels for skin exposure. However, the values suggested are generally those considered non-hazardous under worst case conditions and are not based on experimental evidence. This report briefly summarizes the few studies found in the open literature that might be considered pertinent towards establishing acceptable acute laser radiation levels for skin. The threshold lesion values given for both human and animal skin are discussed and compared with guideline values suggested for safe exposure levels.

Author (TAB)

IAA ENTRIES

A69-35605

MECHANICAL VIBRATIONS-EFFECTS ON MAN, SAFETY MEASURES (LES VIBRATIONS MECANIQUES-ACTION SUR L'HOMME, PREVENTION).

H.-J. Séris (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne, France).

Revue des Corps de Santé des Armées, vol. 10, Feb. 1969, p. 63-81.

Study of the effects of mechanical vibration in industry, and in terrestrial, aerial, and nautical vehicles, to establish standards of vibration tolerance and to develop means for minimizing the harmful effects of excessive vibration on the human body. A block diagram of a mechanical model of the human body is shown. The study uses this schematic model as its frame of reference to measure the effects of test vibrations. It is shown that man is affected by vibrations at frequencies between 0,5 and 100 Hz, with frequencies in the low range from 4 to 10 Hz being the most harmful, since they correspond to the principal resonances of the body. It is precisely this range of frequencies which is most prevalent in industrial and transportation activities and is the most difficult to ameliorate. In addition to fatigue and the lowering of performance levels, chronic exposure to vibrations causes painful skeletal arthritis, particularly of the spine, and loss of mobility. Some special equipment, consisting of harnesses, helmets, boots, and belts, is recommended to mitigate the effect of vibrations where they cannot be reduced.

A69-35834

THE PROBLEM OF ENGINEERING PSYCHOLOGY (K VOPROSU OB INZHENERNOI PSIKHOLOGII).

V. T. Nastenko.

IN: AIRCRAFT CONSTRUCTION AND AIR-FLEET EQUIPMENT (SAMOLETOSTROENIE I TEKHNIKA VOZDUSHNOGO FLOTA). (A69-35813 19-02)

Edited by L. A. Gavrilova.

Kharkov, Izdatel'stvo Khar'kovskogo Gosudarstvennogo Universiteta Nauchno-Tekhnicheskii (Respublikanskii Mezhvedomstvennyi Sbornik, No. 16), 1968, p. 141, 142. In Russian.

General discussion of the meaning of engineering psychology in modern technology with special attention to the problems of man-machine relations in aircraft and spacecraft industries. A tremor-measuring technique for studying the functional state of the central nervous system during supersonic flights is described. The value of the results of such tremographic studies in predicting the performance of humans during space flights is assessed. A portable tremograph is described. The tremograph is used in measuring tremor in a group of 173 subjects in various states of excitation as an indicator of the functional state of their nervous systems.

A69-35894

SIMULATION IN BIOLOGY AND MEDICINE (MODELIROVANIE V BIOLOGII I MEDITSINE).

Edited by N. M. Amosov.

Kiev, Izdatel'stvo Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 3), 1968. 208 p. In Russian.

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A MATHEMATICAL MODEL OF PURPOSEFUL BEHAVIOR (MATEMATICHESKAIA MODEL' TSELEUSTREMLENNOGO POVEDENIIA). S. Ia. Zaslavskii and Z. L. Leibenzon, p. 31-39. (See A69-35895 19-05)

STATISTICAL STUDIES OF THE FORM OF THE RELATIONS BETWEEN THE MINUTE BLOOD CIRCULATION VOLUME, THE OXYGEN CAPACITY OF THE BLOOD, AND THE COEFFICIENT OF UTILIZATION OF BLOOD OXYGEN BY TISSUES (STATISTICHESKIE ISSLEDOVANIIA FORMY SVIAZI **VELICHINAMI** MINUTNOGO KROVOOBRASHCHENIIA, KISLORODNOI EMKOSTI KROVI I KOEFFITSIENTA ISPOL'ZOVANIIA KISLORODA KROVI TKANIAMI). V. I. Khotinok-Khotenko, p. 64-77. 8 refs. (See A69-35896 19-05)

POSSIBLE STRUCTURE OF THE TRANSFER FUNCTION IN THE SYSTEM COMPRISING PULMONARY VENTILATION AND OXYGEN TENSION IN THE ARTERIAL BLOOD (O VOZMOZHNOI STRUKTURE PEREDATOCHNOI FUNKTSII SISTEMY "LEGOCHNAIA VENTILIATSIIA-NAPRIAZHENIE KISLORODA V ARTERIAL'NOI KROVI"). E. A. Shkabara, p. 78-96. 12 refs. (See A69-35897 19-05)

A MULTILAYER NETWORK WITH LATERAL COUPLINGS FOR DISTINGUISHING FEATURES IN THE RECOGNITION OF VISUAL PATTERNS (MNOGOSLOINAIA SET'S LATERAL'NYMI SVIAZIAMI DLIA VYDELENIIA PRIZNAKOV I OPOZNANIIA ZRITEL'NYKH OBRAZOV). V. A. Doliatovskii, I. D. Ponomareva, and G. V. Tsepkov, p. 154-162. 15 refs. (See A69-35898 19-05)

A MATHEMATICAL MODEL OF PURPOSEFUL BEHAVIOR (MATEMATICHESKAIA MODEL' TSELEUSTREMLENNOGO POVEDENIIA).

S. Ia. Zaslavskii and Z. L. Leibenzon.

IN: SIMULATION IN BIOLOGY AND MEDICINE (MODEL-IROVANIE V BIOLOGII I MEDITSINE). (A69-35894 19-05) Edited by N. M. Amosov.

Kiev, Izdatel'stvo Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 3), 1968, p. 31-39. In Russian.

Attempt to construct a mathematical model of the process of reaching a correct decision in a problem situation requiring predictions of the future progress of real events. A mathematical basis for purposeful behavior of human operators in complex systems control situations is developed.

STATISTICAL STUDIES OF THE FORM OF THE RELATIONS BETWEEN THE MINUTE BLOOD CIRCULATION VOLUME, THE OXYGEN CAPACITY OF THE BLOOD, AND THE COEFFICIENT OF UTILIZATION OF BLOOD OXYGEN BY TISSUES (STATISTI-CHESKIE ISSLEDOVANIIA FORMY SVIAZI MEZHDU VELI-CHINAMI MINUTNOGO OB'EMA KROVOOBRASHCHENIIA, KISLORODNOI EMKOSTI KROVI I KOEFFITSIENTA ISPOL'ZO-VANIIA KISLORODA KROVI TKANIAMI).

V. I. Khotinok-Khotenko.

IN: SIMULATION IN BIOLOGY AND MEDICINE (MODEL-IROVANIE V BIOLOGII I MEDITSINE). (A69-35894 19-05) Edited by N. M. Amosov.

Kiev, Izdatel'stvo Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 3), 1968, p. 64-77. 8 refs. In Russian.

Attempt to determine statistical relations between the minute blood circulation volume, the oxygen capacity of the blood, and the blood oxygen consumption rate in tissues of large groups of anemic and healthy men and dogs. Equations describing the relations between the averaged values of these characteristics are derived. V.Z.

A69-35897

POSSIBLE STRUCTURE OF THE TRANSFER FUNCTION IN THE SYSTEM COMPRISING PULMONARY VENTILATION AND TENSION IN THE ARTERIAL BLOOD (O VOZMOZHNOI STRUKTURE PEREDATOCHNOI FUNKTSII SISTEMY "LEGOCHNAIA VENTILIATSIIA-NAPRIAZHENIE KISLORODA V ARTERIAL'NOI KROVI").

E. A. Shkabara.

IN: SIMULATION IN BIOLOGY AND MEDICINE (MODEL-IROVANIE V BIOLOGII I MEDITSINE). (A69-35894 19-05) Edited by N. M. Amosov.

Kiev, Izdatel'stvo Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 3), 1968, p. 78-96. 12 refs. In Russian.

Experimental application of the mathematical methods of the theory of automatic control systems to an analysis of the transient processes in the closed system of the pulmonary reservoir and the arterial portion of the pulmonary vessels of a group of five young males during a sudden change of oxygen content in inhaled air. Expressions are derived for describing the transient process and the transfer function of this system.

A69-35898

A MULTILAYER NETWORK WITH LATERAL COUPLINGS FOR DISTINGUISHING FEATURES IN THE RECOGNITION OF VISUAL PATTERNS (MNOGOSLOINAIA SET'S LATERAL'NYMI SVIAZIAMI DLIA VYDELENIIA PRIZNAKOV I OPOZNANIIA ZRITEL'NYKH OBRAZOV).

V. A. Doliatovskii, I. D. Ponomareva, and G. V. Tsepkov.
IN: SIMULATION IN BIOLOGY AND MEDICINE (MODEL-IROVANIE V BIOLOGII I MEDITSINE). (A69-35894 19-05)
Edited by N. M. Amosov.

Kiev, Izdatel'stvo Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 3), 1968, p. 154-162. 15 refs. In Russian.

Synthesis of a retina model consisting of a matrix of receptor elements and four feature-distinguishing layers. This model, which incorporates the concepts of nonuniform cell distribution, intercellular lateral braking, the formation of receptor fields, and the multilayer structure inherent in the retina of the eye, is designed to perform primary visual data processing. It can be used as the information input device of automatic readers.

V.Z.

A69-35972

CORRELATION BETWEEN DECREASES IN BRAIN γ -AMINOBUTYRIC ACID LEVELS AND SUSCEPTIBILITY TO CONVULSIONS INDUCED BY HYPERBARIC OXYGEN.

J. D. Wood, W. J. Watson, and G. W. Murray (Saskatchewan, University, Dept. of Biochemistry, Saskatoon, Saskatchewan; Defence Research Establishment, Toronto, Canada).

Journal of Neurochemistry, vol. 16, 1969, p. 281-287, 15 refs.

The susceptibility of mice to seizures at hyperbaric pressures of oxygen (OHP) was placed on a quantitative basis and compared with the corresponding rate of decrease in brain GABA concentration. The influence of small amounts of carbon dioxide in the breathing mixture on these effects of OHP was also determined. A correlation between the rate of decrease in GABA and susceptibility to seizures is shown to exist not only over the varying oxygen pressures and varying concentrations of carbon dioxide used in the present experiments but also over varying animal species (a previous study). The critical oxygen pressure for decreases in brain GABA to occur is shown to be 30 psig. This value agrees closely with the well documented critical pressure necessary to produce seizures in both animals and man. The probability that lowered brain GABA levels play a major role in the etiology of OHP convulsions is discussed.

(Author)

A69-35973 *

PLASMOLYSIS OF ESCHERICHIA COLI B/r WITH SUCROSE.

Paul O. Scheie (Pennsylvania State University, Dept. of Biophysics, University Park, Pa.).

Journal of Bacteriology, vol. 98, May 1969, p. 335-340. 19 refs. Grant No. NGR-39-009-008.

Escherichia coli B/r cells were plasmolyzed in sucrose solutions and were observed under phase contrast. The prevalence of plasmolysis under various conditions was noted, and the degree of plasmolysis was categorized as slight, extensive, or severe. The presence of ions reduced the prevalence of plasmolysis. Survival curves showed that extensive plasmolysis was not lethal to colony-forming ability.

(Author)

A69-35975 *

POST-IRRADIATION PROPERTIES OF CULTURED CHINESE HAMSTER CELLS EXPOSED TO ULTRAVIOLET LIGHT.

Paul Todd, Thomas P. Coohill, A. B. Hellewell, and Judith A. Mahoney (Pennsylvania State University, Dept. of Biophysics, University Park, Pa.).

Radiation Research, vol. 38, May 1969, p. 321-339. 46 refs. AEC Contract No. AT (30-1)-3834; Grant No. NGR-39-009-008.

Study of the effect of UV light on cultured Chinese hamster cells, line M3-1. The cells were expose to 2537-angstrom UV light. Postirradiation growth studies indicated that nonsurviving cells do not divide and that cells surviving a 95% lethal exposure resume growth at a normal rate after a 30-hr lag. Split-dose experiments, in which survival was evaluated on the basis of colony formation, indicated that the surviving cells do not repair sublethal injury promptly as with X irradiation but acquire their original resistance after about 30 hr.

G.R.

A69-35976 *

CONVERSION OF ACETATE-2-14C TO 14CO₂ AND 14C-FATTY

ACIDS IN THE PARTIALLY HEPATECTOMIZED RAT (33627). E. D. Neville, K. S. Talarico, and D. D. Feller (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

Society for Experimental Biology and Medicine, Proceedings, vol. 130, 1969, p. 643-651. 17 refs.

Results of an experiment in which 67% of the liver of male rats was removed to determine the relationship of the changes occurring in the oxidation of acetate to changes in fatty acid synthesis. Control rats were exposed to sham surgery, in which the liver was removed, handled, and returned intact to the abdominal cavity. The liver weight and fatty acid content of the liver at various times after surgery are compared for the two groups. The results suggest that in addition to deposition via transport, the fatty acid content of the regenerating liver is increased by synthesis in situ, during the premitotic phase as well as the mitotic phase.

B.H.

A69-35978 *

THE BIOLOGICAL ACTION OF IONIZING RADIATION.

Ernest C. Pollard

American Scientist, vol. 57, no. 2, 1969, p. 206-236. 19 refs. AEC-supported research; Grant No. NGR-39-009-008.

Study of the effects of X rays and radioactivity on living systems. The biological effects of whole-body irradiation and cell irradiation are considered. Bacteria are examined as model systems for the study of radaction, and the effects of DNA degradation are considered in the analysis of biological experiments. A general hypothesis for radiation action is developed in terms of DNA synthesis, genetic transcription, and DNA degradation.

A69-35986

INVESTIGATION OF THE EFFECT OF VERTICAL VIBRATION ON THE EMOTIONAL STATE OF TEST SUBJECTS (UNTERSUCHUNG ZUR WIRKUNG VERTIKALEN SCHWINGENS AUF DIE STIMMUNG VON VERSUCHSPERSONEN).

W. Hawel (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany).

(Internationaler Kongress für Luft- und Raumfahrt-Medizin, 15th, Prague, Czechoslovakia, 1966.)

Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 15, May 1969, p. 83-86. 17 refs. In German.

Study of the effect of vertical vibration on test subjects, showing that while vibration has a distinct effect on the emotional tone of the subject, the effect cannot be classified as a strong stress factor. Test subjects were nine students who underwent two hours of testing. The first hour was spent in study, followed by a half-hour of

vibration and a half-hour filling out a test questionnaire. The vibrations were accelerated to 0.3 g with an amplitude of ±3.03 mm and a frequency of 5 Hz, the maximum acceleration tolerance established for the human body without harmful effects.

A69-35987

SENSORY-PHYSIOLOGICAL BASES OF COURSE-KEEPING DURING GUIDANCE BY RUNWAY LIGHTING (SINNESPHYSI-OLOGISCHE GRUNDLAGEN DES KURSHALTENS BEI ORIEN-TIERUNG AN DER STARTBAHNBEFEUERUNG).

H. Merguet (Ruhr-Universität, Klinikum Essen, Chirurgische Klinik and Poliklinik, Essen, West Germany).

Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 15, May 1969, p. 87-90. In German.

Evaluation of the sensory physiology of pilots attempting to land by means of runway lighting. It is noted that, when basing his landing on fixing and sighting, the pilot can be aided by (1) conventional boundary lighting, if he has a certain minimum ground visibility; (2) a narrow-gauge lighting, which provides enhanced safety of course-keeping under the same conditions; and (3) an additional centerline lighting, which still further enhances the safety of course-keeping under the same conditions.

A69-36024

PERSONNEL SUBSYSTEMS IMPACT ON C-5 EQUIPMENT AND SYSTEM DESIGN.

H. L. Parris and T. J. Hall (Lockheed Aircraft Corp., Lockheed-Georgia Co., Human Factors Engineering Dept., Marietta, Ga.). IN: ANNALS OF ASSURANCE SCIENCES; PROCEEDINGS OF THE EIGHTH RELIABILITY AND MAINTAINABILITY CON-FERENCE, DENVER, COLO., JULY 7-9, 1969. (A69-35999 19-15) Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.

New York, Gordon and Breach, Science Publishers, Inc., 1969, p. 263-271, 8 refs.

Brief description of five representative examples of real-world problems that required special man-machine interface studies in the development of the C-5 equipment and system. Study methodology, principal results, and conclusions pertinent to the effect on human performance as it relates to system performance are presented for: (1) the comfort evaluation of aircrew seats, (2) ground emergency egress provisions, (3) the determination of human pushing ability for manual cargo handling, (4) the prediction of engine exhaust buildup during vehicle off-loading operations, and (5) the prediction of motion sickness incidence during troop transport missions.

A69-36025

FIELD TEST OF A TECHNIQUE FOR ESTABLISHING PERSON-**NEL PERFORMANCE REQUIREMENTS.**

Robert E. Blanchard and Russell L. Smith (Integrated Sciences Corp., Santa Monica, Calif.).

IN: ANNALS OF ASSURANCE SCIENCES; PROCEEDINGS OF THE EIGHTH RELIABILITY AND MAINTAINABILITY CON-FERENCE, DENVER, COLO., JULY 7-9, 1969. (A69-35999 19-15) Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.

New York, Gordon and Breach, Science Publishers, Inc., 1969, p. 272-277, 5 refs.

Results of two field tests of a man-machine modeling technique (TEPPS) designed to quantify and relate human performance to the operability component of systems effectiveness. The first test was performed by the developers of the technique on the radar detection and data-keeping subsystem of a Navy combat information center system. A second test was made using a Navy analyst group. Two general types of problems were noted that confront the development of man-machine modeling techniques: technical/theoretical problems and method implementation. Technical problems include mathematical treatment of functional relationships among man-machine activities and obtaining useful human performance data for use with the models. The implementation problem concerns getting the modeling techniques into use by systems engineers so the techniques may be tested, refined empirically, and their applicability extended.

A69-36026

USE OF A HUMAN RELIABILITY TECHNIQUE TO SELECT DESIRABLE DESIGN CONFIGURATIONS.

D. Meister (Bunker-Ramo Corp., Canoga Park, Calif.), IN: ANNALS OF ASSURANCE SCIENCES; PROCEEDINGS OF THE EIGHTH RELIABILITY AND MAINTAINABILITY CON-FERENCE, DENVER, COLO., JULY 7-9, 1969. (A69-35999 19-15) Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.

New York, Gordon and Breach, Science Publishers, Inc., 1969, p. 278-282. 7 refs.

Evaluation of six subsystem designs on the basis of a human reliability technique as a part of a study of how engineers design. The subsystem designs were compared with equipment reliability evaluations of the same designs. The problems involved in applying a human reliability metric are described.

A69-36168

INITIAL DYNAMICS OF THE EKG DURING AN ELECTRICAL DEFIBRILLATION OF THE HEART (POCHATKOVA DINAMIKA EKG PRI ELEKTRICHNII DEFIBRILIATSII SERTSIA).

V. G. Nikolaev, Ia. P. Chebotar'ov, and I. I. Bikov (Lugans'kii Pedagogichnii Institut, Kafedra Anatomii i Fiziologii, Lugansk, Ukrainian SSR).

Fiziologichnii Zhurnal, vol. 15, May-June 1969, p. 322-327, 7 refs. In Ukrainian.

Observation of EKGs during the passage of defibrillating currents in a group of 11 immobilized dogs. Artefactless EKG recordings are obtained 0.04 to 0.06 sec after the passage of the current, by applying an automatic blocking and synchronization system. Various types of onset of fibrillation are established during the delivery of defibrillating stimuli into cardiac cycle phases.

A69-36169

CHANGES IN THE BASIC HEMODYNAMIC CHARACTERISTICS OF PUPPIES OF PUBERTAL AGE DURING A DECREASE IN THE OXYGEN PARTIAL PRESSURE IN THE AIR (ZMINI GEMODINAMICHNIKH POKAZNIKIV OSNOVNIKH SHCHENIAT PUBERTATNOGO VIKU PRI ZNIZHENNI PART-SIAL'NOGO TISKU KISNIU V POVITRI).

M. M. Koganovs'ka (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Vidil Vikovoi Fiziologii, Kiev, Ukrainian SSR). Fiziologichnii Zhurnal, vol. 15, May-June 1969, p. 328-336, 17 refs. In Ukrainian,

Study of the behavior of the cardiovascular system of six- to seven-month old puppies and adult dogs during inhalation for one hour of a mixture of nitrogen with 14 or 7.8% oxygen. The heart beat rates and the minute blood volume are higher and the arterial pressure and the resistance of the peripheral capillary vessels are lower in puppies exposed to normal air than in puppies exposed to air with subnormal oxygen contents. It is also found that during exposure to subnormal oxygen partial pressures the rates of oxygen transport decrease more sharply in puppies than in adult dogs. It is assumed, however, that this deficiency is compensated in puppies by the more adaptive hemodynamic properties of their blood.

RATS-THEIR COMINGS AND GOINGS.

Walter S. Friauf (National Institutes of Health, Biomedical Engineering and Instrumentation Branch, Bethesda, Md.).

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD.

(A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 34-38.

Discussion of a study of the effects of environmental crowding on individual and group behavior, using observations of a rat colony as raw data. For some tests, individual identification of each of the several hundred rats in the colony is required. A system has been developed in which each rat has an implanted passive resonant circuit, with a different resonant frequency ior each. As the rats pass through portals to particular test stations, the implants are excited and the ringing frequency is measured to give identification and passage information. (Author)

A69-36244

AN OSCILLATOR HAVING NO REACTIVE COMPONENTS FOR USE AS AN INTEGRATED CIRCUIT BIOTELEMETER.

Albert R. Martin (California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD. (A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 39-42. 9 refs.

The ultimate microminiaturization of biotelemeters is to put the whole circuit on an integrated circuit chip. But the reactances and/or the high value of resistance required by conventional LC or RC oscillators are not amenable to IC technology. A modified ring oscillator design requiring only components already used in digital IC gates is described. The circuit transmits in the AM broadcast band and has a range of about 2 ft. The input impedance is 10,000 ohms, the input sensitivity is 6 microvolts for an SNR of 2, and the frequency response is less than Hz to 4 kHz. (Author)

A69-36268

EEG MONITORING DURING THE TREATMENT OF DECOM-PRESSION ILLNESS ("BENDS").

J. Rod Zweizig, John Hanley, A. Cockett, P. Hahn, W. R. Adey, and E. Ruspini (California, University, Los Angeles, Calif.).

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD. (A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 195-200. 11 refs.

There are major obstacles in monitoring physiological parameters during treatment of decompression illness by the hyperbaric procedure. Biotelemetry surmounts the problems due to length of monitoring, the crowed quarters, and diver comfort and safety. Transmitted data from the chamber are in a form compatible with telephone transmission facilities connecting the chamber with hospital-based clinical and basic scientific teams, as well as with the local display of EEG data. Experimental and actual cases of bends were successfully monitored by means of a small multichannel telemetry pack. "Slowing" of the EEG in the parietal region was found immediately following decompression. (Author)

A69-36269

THE GENERAL DESIGN CONSIDERATIONS FOR A WIRELESS TELEMETRY SYSTEM IN THE MEDICAL DIAGNOSIS OF HUMANS.

L. N. Ziecheck (Lewis Associates, Inc., Bethesda, Md.).

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD. (A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 201-206. 5 refs.

Discussion of the utilization of wireless telemetry of physiological signals for diagnostic purposes. The design criteria constraints of such systems are cited. It is shown that signal fidelity, physical size and configuration, distance of transmission, power requirements, and environmental conditions are the main parameters that are to be considered. A warning is given against casual use of wireless transmission, which can often be discouraging both to the physician and the engineer. It is concluded that if good judgment is used in the application and design of telemetry, new ground can be broken and more problems can be solved.

P.G.

A69-36270

A MINIATURIZED TELEMETRY DEVICE FOR THE TRANSMISSION OF THE ELECTRICAL ACTIVITY OF SINGLE NERVE CELLS IN THE BRAIN.

James G. McElligott, John R. Zweizig, and Raymond T. Kado (California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD. (A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 207-210. 5 refs.

Description of a telemeter for transmitting the activity of individual nerve cells in the awake and unrestrained animal. The unit, directly incorporated into the electrode connector plug on the animal's head, possesses a high input impedance and a broad bandwidth. It is constructed inexpensively from readily available stock components and is designed to operate in the FM broadcast band. (Author)

A69-36271

EKG TRANSMISSION FROM EMERGENCY VEHICLES.

Robert J. Huszar and Joseph Haloburdo (Saint Francis Hospital, Dept. of Research, Cardio-Pulmonary Section, Hartford, Conn.). IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD. (A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 211-214, 9 refs.

Several recent studies indicate that the earlier cardiac patients receive treatment the better are their chances for survival. This work describes a system whereby EKG signals are transmitted to the hospital while the patient is being transported there by an emergency vehicle. The equipment in this vehicle consists of (1) rapidly applicable adhesive electrodes, (2) the Cardio-Alert Trans-Monitor (EKG amplifier, an astable multivibrator voltage-controlled oscillator, and a low pass filter), and (3) a 30-W, continuous duty, 155 MHz, FM radio transmitter. A remote transceiver is connected to the alert center by telephone lines. The equipment at the alert center consists of a radio transmitter remote control, a telephone line amplifier, a pulse averaging detector, and standard EKG monitoring equipment. A prototype system has been constructed and tested.

(Author)

A BIOMEDICAL TELEMETRY SYSTEM FOR CLINICAL APPLI-CATIONS.

George D. Summers and Alfred J. Temps, Jr. (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.).

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD. (A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 215-221.

A biotelemetry system has been developed which can be regarded as a candidate prototype of a generalized system for clinical applications. The object of this developmental program is to define a type of equipment which would be useful in patient care, accepted by the medical profession, standardized for widest application, economically attractive, and psychologically acceptable to the patient, his family, and society. (Author)

A69-36273

ROUTINE TELEMETRY OF ELECTROCARDIOGRAMS AND COMPUTER ANALYSIS.

P. R. Amlinger (Missouri, University, School of Medicine, Columbia, Mo.),

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD. (A69-36237 19-07)

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 222-227. 11 refs.

PHS Grant No. 3-S03-RM-00009-01S1.

An automated computer network for analyzing electrocardiograms is operated by Missouri Regional Medical Program. The system is centered in the Medical Computer Center of Missouri University's Columbia campus. Cardiac-data acquisition stations are located in physicians' offices and hospitals as far away as 300 miles. Normal long-distance telephone lines are used for bidirectional communications. Different settings are chosen deliberately for this first pilot project. They range from a general practitioner's office in a remote rural area to a university's medical center. The system is a replica of that developed by the U.S. Public Health Service. (Author)

A69-36294 *

EFFECT OF NOREPINEPHRINE AND UNCOUPLING AGENTS ON BROWN ADIPOSE TISSUE.

Robert Emrie Smith (California, University, School of Veterinary Medicine, Dept. of Physiological Sciences, Davis, Calif.), Barbara A. Horwitz, and Paul A. Herd.

Canadian Journal of Physiology and Pharmacology, vol. 46, no. 6, 1968, p. 897-902. 15 refs.

PHS Grant No. HD-03268; Grant No. NGR-05-004-035.

Examination of the *in vivo* effect of 2,4-dinitrophenol (DNP) on the brown adipose tissue of cold-exposed rats, as well as the *in vitro* response of this tissue to DNP and dicumarol. The study indicates that brown fat possesses a functional electron transport-coupled phosphorylating system. Moreover, the fact that a norepinephrine-induced thermogenic response (*in vivo*) can be elicited from the brown fat after DNP administration implies that the effect of norepinephrine (NE) is not primarily due either to a physiological uncoupling by fatty acids, the level of which is increased by NE, or to stimulation of an ATP-ase system. Alternatively, the data suggest that under basal conditions the heat production of the brown fat is limited by the availability of substrate rather than ADP. It is therefore proposed that the thermogenic effect of NE results from the stimulation of lipolysis and an attendant increase of substrate available for oxidation.

G.R.

A69-36318

LIFE SUPPORT

D. J. Watanabe and G. E. Laubach (North American Rockwell Corp., Space Div., Environmental Control Systems Dept., Downey, Calif.). Space/Aeronautics, vol. 52, July 1969, p. 81-87. 31 refs.

Discussion of problems in the development of regenerative support systems for future space flights. Radio isotopes are considered as a thermal energy source. Reclamation has been the most intensively studied problem of water management. Among carbon dioxide removal and concentration methods, the molecular-sieve technique is the farthest advanced. The well-known Sabatier and Bosch methods of onboard oxygen generation, both of which rely on separate processes for carbon dioxide reduction and water electrolysis, are in advanced stages of development.

G.R.

A69-36374 *

INCREASED TOLERANCE OF ORTHOSTATIC STRESS IN PATIENTS WITH HEART DISEASE.

Walter H. Abelmann (Boston City Hospital, Thorndike Memorial Laboratory, Boston, Mass.) and Khaja Fareeduddin (Harvard University, Harvard Medical School, Dept. of Medicine, Boston, Mass.)

American Journal of Cardiology, vol. 23, Mar. 1969, p. 354-363. 24 refs.

NIH Grants No. HE-10539; No. HE-5244; PHS Grant No. FP-76; Grant No. NGR-22-007-019.

Study of increased tolerance of orthostatic stress in patients with heart failure. Responses of heart rate and blood pressure to passive 70% upright tilt were measured in six healthy subjects and 33 patients with heart disease. The results were analyzed in relation to hemodynamic data in the supine position, showing that improved tolerance of orthostatic stress in cardiac patients has a positive relation to increased intravascular volume, increased peripheral resistance, and increased ventricular filling pressures. These hemodynamic abnormalities are characteristic of heart failure. B.H.

A69-36377

RAPID PHOTORESPONSES IN THE RETINA AND THEIR RELEVANCE TO VISION RESEARCH.

William L. Pak (Purdue University, Dept. of Biological Sciences, Lafayette, Ind.).

(International Conference on Photosensitization in Solids, 2nd, Tucson, Ariz., Jan. 29-31, 1968.)

Photochemistry and Photobiology, vol. 8, no. 5, 1968, p. 495-503. 29 refs.

NSF Grant No. GB-4312.

An intense short flash stimulus gives rise to transient electrical responses of about a millisecond duration from vertebrate and some invertebrate retinas. Some aspects of these rapid retinal responses are reviewed. It is concluded (1) that they probably represent electrical expressions of photochemical events or events closely associated with the photochemistry of visual pigment, (2) that they do not represent the excitation of the photoreceptors per se, and (3) that still unidentified, silent processes intervene between them and the excitation of the photoreceptor. The fact that photochemical events produce movements of charges, which result in these responses, is of interest in itself. Moreover, these responses present a relatively simple and effective technique for probing the role of visual pigment in visual excitation in the intact retina. (Author)

Δ69-36448 *

VARIATION IN THE ANNUAL GENERAL AVIATION ACCI-DENT RATE AS IT RELATES TO FLIGHT TRAINING.

John D. Dougherty (Harvard University, Harvard School of Public Health, Boston; USAF, Massachusetts Air National Guard, Mass.). *Aerospace Medicine*, vol. 40, July 1969, p. 699-707. 8 refs. Grant No. NGT-22-007-008.

In a previous epidemiologic survey, variation in annual accident rates in general aviation was found to be far in excess of that expected from chance. This work examines this variation in the overall and fatal annual accident rates in comparison with annual variation in training activity. The overall annual accident rate was inversely correlated with variation in the proportion of student pilots. On the hypothesis that training activity would reduce the overall accident rate, it was expected that variation in the annual rate would also be inversely correlated with variation in training toward other airman's certificates. When the overall rate was compared to the proportion of pilots not engaged in any form of training, a significant improvement in correlation was found. In spite of the close association found between training activity and the overall accident rate, the fatal accident rate was not significantly related to the proportion of pilots not engaged in training. However, when the fatal rate was compared to the pilots not in training, in addition to those recently trained, a significant correlation was found. After a correction was made for training activity, the overall annual rate varied so slightly that the accident rate almost appeared to be fixed. On this basis, the overall annual accident rate was used as an index of exposure for that year. Various forms of fatal accidents were corrected for exposure on this basis. The variation in these fatal accident rates also conformed to the hypothesis that standardized and supervised periodic flight training could substantially reduce the present general aviation accident rate. (Author)

A69-36449 *

RELATIONSHIP OF PAPER SPEED TO PRECISION OF PULSE WAVE MEASUREMENTS—A MULTIPLE OBSERVER STUDY OF LEFT VENTRICULAR EJECTION TIME.

David H. Spodick (Lemuel Shattuck Hospital, Medical Services, Cardiology Div.; Tufts University, School of Medicine; Boston University, School of Medicine, Boston, Mass.), Sudarshan Kumar, Athanassios P. Flessas (Tufts University, School of Medicine, Boston, Mass.), Achara D. Shiratanaban (Veterans Administration Hospital, Providence, R.I.), Rasma V. Klints (Lemuel Shattuck Hospital, Boston, Mass.), Hugo Muench (Harvard University, Harvard School of Public Health, Boston; Massachusetts Institute of Technology, Cambridge, Mass.), and Gerald Sosler.

Aerospace Medicine, vol. 40, July 1969, p. 707-709.

Grant No. NGR-22-012-006.

The effect of paper speed variations on pulse wave measurements was studied by five independent observers who calculated carotid-derived left ventricular ejection times in eight subjects. Statistical analysis showed no differences in performance among observers and a slight downward trend in numerical results with increasing paper speed. The latter, while significant, was so small (approximately -5 msec between speeds of 25 and 200 mm/sec) as to be judged negligible in terms of the magnitude of the ejection period and the precision of individual readings. (Author)

A69-36450

AEROMEDICAL ASPECTS OF THE FIRST NONSTOP TRANS-ATLANTIC HELICOPTER FLIGHT. I—GENERAL MISSION OVERVIEW AND SUBJECTIVE FATIGUE ANALYSES.

Clifford J. Buckley (USAF, Military Airlift Command, Aerospace Rescue and Recovery Service, Scott AFB, III.) and Bryce O. Hartman (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).

Aerospace Medicine, vol. 40, July 1969, p. 710-713.

Study of the effects of stress and fatigue on aircrew members participating in the first nonstop transatlantic helicopter flight. A general mission narrative and observations of the flight surgeon (crew member) are presented together with results of subjective fatigue rating, sleep pattern survey studies, continuous electrocardiographic recordings, and the analyses of altered excretion patterns of urinary constituents commonly effected by stress and/or fatigue. Results indicate that satisfactory aircrew performance can be maintained when helicopter crew members are exposed to the levels of stress and fatigue which were encountered on this record duration helicopter flight. (Author)

A69-36451

AEROMEDICAL ASPECTS OF THE FIRST NONSTOP TRANS-ATLANTIC HELICOPTER FLIGHT. II—HEART RATE AND ECG CHANGES.

William K. Brown, James D. Rogge, Jerry F. Meyer, Clifford J. Buckley, and Clay A. Brown (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; USAF, Military Airlift Command, Aerospace Rescue and Recovery Service, Scott AFB, III.).

Aerospace Medicine, vol. 40, July 1969, p. 714-717. 12 refs.

Electrocardiographic data were recorded continuously on three crew members during a 30-hr transatlantic flight in an H-3 helicopter. Heart rate changes during the flight were compared with control heart rates during routine daily activities. Changes in heart rates during flight indicated that there were significant periods of rest. The marked increases in heart rate (associated with obvious stressful events such as air refueling) indicate that heart rate may be a good index of acute stress. However, the lack of change in mean heart rate over control values in two of the three crew members indicates that either the stress was less than expected or heart rate does not adequately reflect prolonged stress. (Author)

A69-36452

AEROMEDICAL ASPECTS OF THE FIRST NONSTOP TRANS-ATLANTIC HELICOPTER FLIGHT. III—ENDOCRINE-METABOL-IC EFFECTS.

Henry B. Hale, Edgar W. Williams, and Clifford J. Buckley (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; USAF, Military Airlift Command, Aerospace Rescue and Recovery Service, Scott AFB, III.).

Aerospace Medicine, vol. 40, July 1969, p. 718-723. 12 refs.

Endocrine-metabolic appraisal was made by means of urinalysis for all participants (2 crews of 5 men each) in the first nonstop, transatlantic helicopter flight. Serial urine specimens were analyzed for epinephrine, norepinephrine, 17-hydrocorticosteroids (17-OHCS), urea, creatinine, phosphorus, magnesium, potassium, and sodium. Nonspecific stress was evident, as the flight caused a 143% gain in epinephrine, a 25% gain in urea, and a 51% reduction in the norepinephrine/epinephrine ratio. It also modified the circadian trends for 17-OHCS and phosphorus. The interindividual endocrine-metabolic variability was high.

A69-36453

EFFECTIVENESS OF SPACE CREW PERFORMANCE SUBSE-QUENT TO SUDDEN SLEEP AROUSAL.

Joseph L. Seminara and Richard J. Shavelson (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.). Aerospace Medicine, vol. 40, July 1969, p. 723-727. 8 refs.

Four test subjects, participating in a five-day lunar mission simulation study, performed space-typical emergency responses to an audible alarm which sounded during sleep and during normal-awake periods. It was found that the time to perform a task upon sudden sleep arousal was inversely related to the length of time required to perform a task. It was also found that while the largest decrement in performance time occurs within the first three minutes subsequent to awakening, the effects of sleep drowsiness persisted up to at least 12 minutes. The results of this study have implications for selecting between simultaneous and staggered sleep schedules. (Author)

A69-36454 # BIOLOGIC ACTIVITY OF NOBLE GASES.

J. Ryan Neville and Domenic A. Maio (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).

Aerospace Medicine, vol. 40, July 1969, p. 733-736. 19 refs.

Brief discussion of several theoretical and practical points concerning the effect of noble gases at pressures less than one atmosphere on oxygen consumption by mammalian tissue. In particular, recently published experimental findings of Longmuir, et al. (1968) regarding the effect of xenon, krypton, nitrogen, and nitrous oxide on oxygen consumption of rat liver slices are analyzed in light of earlier findings by Maio and Neville (1967). It is concluded

that nonstandard technical treatment as well as uncontrolled variables account for the findings of Longmuir. Literature evidence is discussed indicating that (1) noble gases can suppress oxygen consumption of mammalian tissues in vitro when compared with 100% oxygen control values and (2) oxygen consumption of mammalian tissue under equilibrated, steady-state conditions is constant within wide ranges of oxygen concentration. (Author)

A69-36455

RECOVERY OF POTABLE WATER FROM HUMAN URINE.

D. F. Putnam and E. C. Thomas (McDonnell Douglas Corp., McDonnell Douglas Astronautics Co., Huntington Beach, Calif.).

Aerospace Medicine, vol. 40, July 1969, p. 736-739. 7 refs.

Open-cycle air evaporation was selected as the first water-recovery system for evaluation in manned chamber tests in preference to such alternates as closed-cycle air evaporation, electro-dialysis, vapor pyrolysis, vacuum distillation, vapor compression, membrane permeation, reverse osmosis, and lyophilization. The selection of open-cycle air evaporation was made on the basis of tradeoff studies which considered operation in null gravity, degree of reliability, fixed weight, expendable weight, power requirements, percentage of water recovered, availability of waste heat, and system volume. The open cycle air evaporation system is discussed and its unique advantages are summarized. A new method of feeding urine which prevents flooding of the wick evaporator is described. (Author)

A69-36456

PREDICTION OF THE FINAL VOLUME OF THE HUMAN BODY EXPOSED TO A VACUUM.

J. F. Sprouffske, J. C. Pittman, and W. C. Kaufman (USAF, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N.Mex.).

(Aerospace Medical Association, Annual Scientific Meeting, 39th, Miami Beach, Fla., May 6-9, 1968.)

Aerospace Medicine, vol. 40, July 1969, p. 740-743.

Dogs exposed to a vacuum expand markedly due to expansion of trapped gases and evolution of water vapor. In order to predict the torso expansion of man during such an exposure, a device was built to measure elasticity of skin in vivo. Skin elasticity was measured in mongrel dogs, beagles, chimpanzees, and men. Using these data and assuming a simple cylindrical shape for the torso, the final volumes of these animals were predicted: 6.5 times the initial volume for mongrels, 3.6 for beagles, 5.6 for chimpanzees, and 3.9 for man. For mongrels, beagles, and chimpanzees, the volumes observed were smaller than predicted: about 40% for mongrels, 75% for beagles, and 33% for chimpanzees. These discrepancies indicate that other anatomical features as well as the elasticity of skin contribute to the expansion of a living body exposed to a vacuum. (Author)

A69-36457 *

SELECTION OF GRAVITATIONAL ENVIRONMENT BY LOCO-MOTION IN FIELDS OF ACCELERATION.

A. B. Broderson and K. O. Lange (Kentucky, University, Wenner-Gren Aeronautical Research Laboratory, Lexington, Ky.). Aerospace Medicine, vol. 40, July 1969, p. 747-754. 26 refs. Grant No. NGL-18-001-003.

In preparation for in-space, behavioral studies of the gravity requirements of earth organisms, the locomotion behavior of the Sprague Dawley rat in centrifugally-generated gravity fields was experimentally determined. The investigations show that rats discriminate magnitudes of gravity, that high gravity is aversive, and that the animals quickly learn to escape high gravities and show preference for 1g in various types of parabolic and spiral centrifuges. Repeated exposure strengthens and stabilizes this response, though some adaptation may also occur. Experienced rats run to their preferred gravity in less than 30 sec, running paths being affected by

whole-body Coriolis acceleration. Because the male, Sprague Dawley rat rapidly demonstrates pronounced and stable gravity preference behavior at levels above 1g, it was chosen as the subject for in-space investigations of the range between earth gravity and weightlessness.

(Aurthor)

A69-36458 *

CHANGES IN PERCEIVED SIZE OF HIGH LUMINANCE TARGETS.

Richard F. Haines (NASA, Ames Research Center, Moffett Field, Calif.).

Aerospace Medicine, vol. 40, July 1969, p. 754-758. 24 refs.

Investigation of the relationship between target luminance, shape, and size and its apparent size. Various diffuse white targets were foveally fixated by three highly trained male observers. Target luminances ranged from 0 to 13,000 foot Lamberts, and target sizes ranged from 39 min of arc to 2 deg, 35 min of arc in width. An unilluminated (black) background was used. The observer moved a point source of light behind the target along each of four meridians until it just disappeared at the target's apparent edge. An apparent expansion of the target occurred between the unilluminated and the illuminated conditions which averaged over 5 min of arc. However, when a filter was used across the entire field of view to reduce the luminance of the point source and the target by the same amount, no regular relationship was found between target luminance or size and its apparent size. All observers remarked that the square target appeared enlarged and quite round under high luminance conditions. Possible explanations for and applications of these data are given.

(Author)

A69-36459

HEAD SHIELDING PROTECTION FOR BEAGLES EXPOSED TO SUPRALETHAL DOSES OF PULSES MIXED GAMMA-NEUTRON RADIATIONS.

James W. Thorp (Defense Atomic Support Agency, Armed Forces Radiobiology Research Institute, Bethesda, Md.).

Aerospace Medicine, vol. 40, July 1969, p. 759-761. 10 refs.

Results of administering supralethal doses of pulsed, mixed gamma-neutron radiations from a TRIGA reactor to five groups of beagles (eight per group). Exposures included unshielded, headshielded, and trunk-shielded dogs. The midline tissue dose behind the shield was approximately 6% of the midline tissue dose at the same point without the shield in place. Head shielding prolonged survival and effectiveness, but trunk shielding was not beneficial. Unshielded and trunk-shielded dogs which received 14,000 rads to the head all exhibited symptoms of central nervous system (CNS) damage within 20 min postexposure; survival times were 18.5 \pm 1.9 and 26.0 \pm 5.6 hr, respectively. Symptoms of CNS damage occurred immediately in trunk-shielded dogs which received 22,000 rads to the head; survival time was 15.8 ± 2.4 hr. There were no overt symptoms of CNS damage in head-shielded dogs that received 19,000 or 25,000 rads to the chest, and their survival times were 45.4 \pm 5.3 and 26.1 \pm 1.3 hr, respectively. (Author)

A69-36461

CORONARY ANGIOGRAPHY FOR EVALUATING CERTAIN CARDIAC PROBLEMS OF AIRCREW.

 ${\sf G.}$ M. FitzGibbon (National Defence Medical Centre, Ottawa, Canada).

Aerospace Medicine, vol. 40, July 1969, p. 774-779. 13 refs.

Results of the examination of 27 aircrew members with suspected coronary artery disease, using selective cine-coronary angiography. Half of these personnel also had cardiac hemodynamic studies at rest and during increased cardiac work. Problems evaluated included nonspecific ST-T abnormalities, atrio- and intra-ventricular conduction disturbances, and silent and overt myocardial infarction. Only two subjects had cardiac symptoms. Thirteen of the patients examined were returned to flying duty, and the remainder, including three who underwent myocardial revascularization operations, were grounded. Representative case histories are given. (Author)

A69-36462

SOME EXPERIENCES WITH THE ROUTINE ELECTROCARDIO-GRAM IN THE MEDICAL CERTIFICATION OF PILOTS.

Charles M. Brake (Federal Aviation Administration, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

Aerospace Medicine, vol. 40, July 1969, p. 780, 781.

Periodic electrocardiograms are required for medical certification of certain individuals. Of a group of 18,802 electrocardiograms, 20% demonstrated some abnormality. The majority of this group of abnormals were found to be fit after a careful evaluation. A major difficulty is encountered in standards of technique during the recording of the tracings. The electrocardiogram is a screening tool and is never utilized as the only determinant as to fitness. (Author)

A69-36463

COMPLETE LEFT BUNDLE BRANCH BLOCK IN ASYMPTOMATIC AIRMEN.

Charles M. Brake (Federal Aviation Administration, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

Aerospae Medicine, vol. 40, July 1969, p. 781, 782. 5 refs.

The available clinical data on 89 ambulant airmen with complete left bundle branch block were reviewed. Approximately one-third had no demonstrable evidence of organic heart disease at the time of their last evaluation. Conditions most often found were hypertension, coronary artery disease, and valvular heart disease. The nature and course of the basic disorder (not the electrocardiographic diagnosis) are the most important factors to consider. (Author)

A69-36656

STUDIES ON THE BLOOD FLOW IN THE LUNG.

Yuan-Cheng Fung (California, University, La Jolla, Calif.).

IN: CANADIAN CONGRESS OF APPLIED MECHANICS, 2ND, UNIVERSITY OF WATERLOO, WATERLOO, ONTARIO, CANADA, MAY 20-23, 1969, PROCEEDINGS. (A69-36655 19-23) Edited by N. C. Lind.

Waterloo, Canada, Waterloo, University, 1969, p. 433-453. 21 refs. NSF Grant No. GK-1415; Grant No. AF AFOSR 1186-67.

Consideration of the blood vessels in the lung, which form a system with a specialized geometry. In the case of the pulmonary alveolar bed, the blood vessels can be described as forming a sheet. Histological evidence of the sheet geometry is presented, and fluid-dynamical consequences of the sheet flow are discussed. It is shown that, in the range of linear elasticity, the fourth power of the local average thickness of the sheet satisfies the Laplace equation and that a number of boundary-value problems related to the lung can be solved. Further details are provided by macroscopic modeling experiments. Theoretical solutions based on the Navier-Stokes equations are presented.

A69-36746

LIFE, ITS NATURE, ORIGIN, AND EVOLUTION (ZHIZN', EE PRIRODA, PROISKHOZHDENIE I RAZVITIE) (2nd enlarged Edition).

A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968. 176 p. 33 refs. In Russian.

Modern theories on the origin, nature, and evolution of life are examined from the viewpoint of dialectic materialism. Topics discussed include the prebiological evolution of compounds of carbon, development of protobiological systems, and formation of primary organisms. Special attention is given to the general trends of evolution, unity between the organism and the living medium, differentiation of cell organisms, and further organization of living bodies.

Z.W.

A69-36747

PROBLEMS OF NEUROCYBERNETICS AND NEUROBIONICS (PROBLEMY NEIROKIBERNETIKI I NEIROBIONIKI).

S. N. Braines and V. B. Syechinskii.

Moscow, Izdatel'stvo Meditsina, 1968. 232 p. 182 refs. In Russian.

The basic problems and methods of neurocybernetics and neurobionics are discussed, as well as the relations between these sciences and other sciences, such as mathematics and medicine. The properties of various mathematical and physiological models of neurons and cerebral nervous networks are analyzed, taking into account presynaptic inhibition. The uses of artificial neurons in devices simulating certain aspects of cerebral activity are considered. Modern image-recognition theories and techniques are explained, and biological experiments are described to illustrate their applications. Special attention is given to the authors' studies of biological control systems, including those controlling the physiological parameters and functions of the human organism. The causes of the high reliability and stability of biological control systems are analyzed, and the possibility of creating artificial neurons with comparable levels of stability is assessed. Also discussed are the applications of neurocybernetics to the problems of pathological processes and aging, as well as to disease diagnostics using image-recognition algorithms and to automatic control of anesthetic states. The book is intended for biologists, physicians, and engineers concerned with the current state of the neurocybernetic science.

A69-36832 *

A DYNAMICAL EXPLANATION OF THE FALLING CAT PHENOMENON.

T. R. Kane and M. P. Scher (Stanford University, Dept. of Applied Mechanics, Stanford, Calif.).

International Journal of Solids and Structures, vol. 5, July 1969, p. 663-670. 7 refs.

Grant No. NGR-05-020-209.

Description of a mechanical system whose motion, when proceeding in accordance with the laws of dynamics, possesses the salient features of the motion of a falling cat. The system to be analyzed consists of two rigid bodies A and B, which have one common point O. The salient features of the motion of the cat are presented in a diagram.

A69-36867

PRECURSOR CEREBRAL CIRCULATION MODELS.

M. L. Roller and M. E. Clark (Illinois, University, Dept. of Theoretical and Applied Mechanics, Urbana, III.).

(American Society of Mechanical Engineers, Biochemical and Human Factors Division Conference, 3rd, University of Michigan, Ann Arbor, Mich., June 12, 13, 1969.)

Journal of Biomechanics, vol. 2, July 1969, p. 241-250. 11 refs.

Discussion of pulsatile-flow flexible-vessel models of arterial systems. Hydraulic transmission line theory is used to formulate the models which, since they contain all the essential characteristics of the cerebral circulation, can be called precursors of more involved and complete models of the vessels afterent and efferent to the circle of Willis (the main distribution center for cerebral blood). A unique feature of this prototype system and of the models considered is the rejoining of arteries that previously bifurcate so as to form vessel loops, thus providing alternate flow paths in case of injury to or disease in the various parts of the system. (Author)

A69-36868

COMPARISON OF LINEARIZED WAVE PROPAGATION MODELS FOR ARTERIAL BLOOD FLOW ANALYSIS.

Robert H. Cox (Pennsylvania, University, Graduate Hospital, Bockus Research Institute, Philadelphia, Pa.).

American Society of Mechanical Engineers, Biochemical and Human Factors Division Conference, 3rd, University of Michigan, Ann Arbor, Mich., June 12, 13, 1969.)

Journal of Biomechanics, vol. 2, July 1969, p. 251-265. 37 refs. PHS Grant No. HE-07762; Contract No. Nonr-551(54).

Review of linearized wave propagation models which can be used to predict both transmission characteristics and hydraulic fluid impedance values based upon system input parameters. Most of the models considered are concerned with the propagation of small, axisymmetric, harmonic disturbances through an incompressible, Newtonian fluid contained within a distensible tube of long length. The equations of motion of the fluid are usually described by the linearized Navier-Stokes equations. The equations of motion of the wall used in the various models showed a great deal of variability. The models can be divided into three categories. A comparison of the phase velocity and transmission per wavelength predicted by the different models is made. (Author)

A69-37100 *

SURFACE FEATURES OF CULTURED MAMMALIAN CELLS.

Paul Scheie and Helge Dalen (Pennsylvania State University, Biophysics Dept., University Park, Pa.).

IN: SCANNING ELECTRON MICROSCOPY; IIT RESEARCH INSTITUTE, ANNUAL SYMPOSIUM, 2ND, CHICAGO, ILL., APRIL 29-MAY 1, 1969, PROCEEDINGS.

Chicago, IIT Research Institute, 1969. 7 p. 8 refs.

AEC Contract No. AT (30-1)-3834; Grant No. NGR-39-009-008.

Description of a technique developed for studying the growth morphology of cultured mammalian cells in situ with the scanning electron microscope. These cells have soft surfaces and must be adequately prepared for the low pressures to which they are subjected. Glutaraldehyde was used as a fixative with osmium tetroxide as a postfixative. This procedure left the specimens intact and reasonably insensitive to beam current damage. Several cell lines have been investigated, including both normal and malignant strains. Special attention has been given to the changes in surface morphology which take place throughout the mitotic cycle of Chang's liver cells. (Author)

A69-37230

MICROORGANISMS AND THE COSMOS (MIKROORGANIZMY I KOSMOS).

L. I. Rubenchik.

Kiev, Izdatel'stvo Naukova Dumka, 1968. 116 p. 27 refs. In Russian.

The current state of knowledge and the prospects of research in cosmic microbiology are reviewed. Special attention is given to the problems of the existence of life, in the form of microorganisms, on other planets and in cosmic space. The utilization of microorganisms for creating a biological regenerative life-support system in the cabin of a space vehicle is examined. The use of microorganisms as biological indicators monitoring the effects of cosmic conditions on living organisms is described.

Z.W.

A69-37240

PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA).

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968. 251 p. In Russian.

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METRICHESKIKH METODOV OBSLEDOVANIIA, PRIMENIAEMYKH V TSELIAKH PROFOTBORA). S. R. Raskatova, p. 235-240. (See A69-37278 20-05)

A69-37241

SOME CURRENT PROBLEMS IN STUDIES OF THE ANALYSOR FUNCTIONS OF ASTRONAUTS DURING FLIGHT (NEKOTORYE AKTUAL'NYE VOPROSY ISSLEDOVANIIA ANALIZATORNOI FUNKTSII U KOSMONAVTOV V POLETE).

M. D. Emel'ianov

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 5-14, 32 refs. In Russian,

Discussion of the results of observations of the vestibular and motor analysor functions of Soviet astronauts Titov, Feoktistov, Komarov, Egorov, Nikolaev, Popovich, Bykovskii, and Tereshkova during orbital flights and ground simulation tests. It is maintained that the illusory sensations regarding the orientation in space, reported by some of the astronauts, are a result of conflicting perceptions of the gravitational and visual verticals, due to conditioned reflexes. Cortical dynamics is believed to be basic in the vestibular and motor analysor function control systems. Suggestions are given for further studies in this field.

Δ69-37242

CHANGES IN THE ELECTRICAL ACTIVITY OF THE ANIMAL AND HUMAN CEREBRUM DURING STIMULATION OF THE VESTIBULAR APPARATUS (IZMENENIE ELEKTRICHESKOI AKTIVNOSTI MOZGA ZHIVOTNYKH I CHELOVEKA PRI RAZDRAZHENII VESTIBULIARNOGO APPARATA).

V. G. Samsonova.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 14-23, 11 refs. In Russian.

Investigation of the response of individual neurons of the visual cortex of immobilized frogs to thermal vestibular stimulation and to light flash stimulation. The total reaction of various portions of the cerebrum to such stimuli and the ability to recognize the rhythm of light flickering by man and frog are also discussed. A close relation was established between the reactions of the vestibular analysor and the visual analysor to stimuli when isolated stimulation and complex stimulation techniques were combined in the study.

A69-37243

ACTIVITY OF THE PHASE AND TONIC SYSTEMS OF THE OCULOMOTOR APPARATUS IN SOME VESTIBULAR RE-FLEXES AND NYSTAGMUS (AKTIVNOST' FAZNOI I TONI-CHESKOI SISTEM GLAZODVIGATEL'NOGO APPARATA V NEKOTORYKH VESTIBULIARNYKH REFLEKSAKH I VES-TIBULIARNOM NISTAGME).

D. P. Matiushkin.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO (FIZIOLOGIIA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 23-26. 6 refs. In Russian.

Investigation of the behavior of the phase and tonic systems of the oculomotor apparatus of rabbits during vestibular reflexes (produced in the rabbits by rotation about a longitudinal axis) and during postrotational nystagmus. It is found that only the tonic system of the oculomotor muscle is stimulated when the rotation in the direction of the muscle is slow, while both the tonic and the phase systems are stimulated when the rates of rotation are high. Experiments indicate that the tonic system is primarily responsible for slow nystagmus phases, while the phase system largely accounts for fast nystagmus phases.

A69-37244

AB9-37244 # ELECTROPHYSIOLOGICAL STUDY OF THE INTERACTION BETWEEN THE VESTIBULAR AND VISUAL AFFERENT SYSTEMS (ELEKTROFIZIOLOGICHESKOE ISSLEDOVANIE VZAIMODEISTVIIA VESTIBULIARNOI I ZRITEL'NOI AF-FERENTNYKH SISTEM).

G. I. Gorgiladze and G. D. Smirnov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO ANALIZATORA). (FIZIOLOGIIA (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 27-42. 32 refs. In Russian.

Investigation of the effect of polarization of the labyrinth by a dc current on the stimulation of the visual system and on the activity of individual neurons in the visual cortex of a group of 68 cats. A cathode oscillograph with an eight-channel electroencephalograph is used for recording neuron responses. The activity of individual visual elements was monitored from gyrus lateralis medialis by extracellular glass electrodes filled with a potassium chloride solution. It is concluded that polarization of the labyrinth, skin irritation, and electrical stimulation of the reticular formation of the mid-brain have an inhibitive effect on the responses of the visual cortex to stimulation of the eye by single light flashes.

A69-37245

A MATHEMATICAL MODEL OF THE OCULOMOTOR APPARA-TUS (MATEMATICHESKAIA MODEL' GLAZODVIGATEL'NOGO APPARATA).

A. A. Petrov, V. G. Sragovich, and B. G. Sushkov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA **VESTIBULIARNOGO** ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 43-48, In Russian.

Outline of a multilevel mathematical model of the oculomotor apparatus represented by a set of neuron networks and based on the concept of complex oculomotor activators. The model reflects recent advances of the automation theory and is conceived as a more promising alternative to other proposed models. Possible mechanisms of various types of eye motions and stabilization of the position of the eye are discussed. The results of an experimental computer analysis of the properties of this model are also discussed.

A69-37246

EFFECT OF THE POSTURE ON THE SENSORIMOTOR COORDI-NATION OF MAN (VLIIANIE POZY NA SENSORNO-MOTOR-NUIU KOORDINATSIIU CHELOVEKA).

A. A. Koreshkov and G. M. Aboian.
IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO (FIZIOLOGIIA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 48-51. In Russian.

Description of experiments in which a group of subjects performed various graphic assignments in upright, reclining, and prone positions in a special hinged armchair. The coordination of motions of the subjects is discussed in terms of the interaction of the vestibular, visual, and motor analysors. The drawing of sinusoids was performed better in an upright sitting position.

A69-37247

INTERACTION BETWEEN CERTAIN ANALYSORS DURING THE FORMATION OF MOTOR REACTIONS IN ANIMALS DUR-ING WEIGHTLESSNESS (O VZAIMODEISTVII NEKOTORYKH ANALIZATOROV PRI FORMIROVANII MOTORNYKH REAKTSII ZHIVOTNYKH V NEVESOMOSTI).

L. A. Kitaev-Smyk.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR

ANALIZATORA). (FIZIOLOGIIA VESTIBULIARNOGO (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdateľstvo Nauka, 1968, p. 51-58. 9 refs. In Russian.

Discussion of the behavioral reactions of groups of 24 rabbits and 18 cats experiencing brief weightlessness on an aircraft during its motion along a parabolic trajectory. The animals were intact, with obscured vision, or partially and completely labyrinthectomized for various periods of time prior to the experiments. Accelerations of 1.8 g preceded and followed the weightlessness. The motor activity of the animals during this phase of flight was filmed in a total of 210 experiments. The enhanced activity of the tonic and motor components of analysor functions during weightlessness is noted. It is concluded that the gravity receptors and the visual analysor are two major information suppliers which compete in controlling the motor activity in weightlessness.

A69-37248

INVESTIGATION OF THE ORIENTATION REFLEXES OF ANI-MALS IN WEIGHTLESSNESS (ISSLEDOVANIE USTANOVOCH-NYKH REFLEKSOV ZHIVOTNYKH PRI NEVESOMOSTI).

L. A. Kitaev-Smyk.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO ANALIZATORA). (FIZIOLOGIIA (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 59-68. 10 refs. In Russian.

Investigation of the in- and post-weightlessness recovery of the sense of orientation in intact and labyrinthectomized cats and rabbits during flights along parabolic trajectories in a total of 240 experiments including 170 experiments under natural gravity. Motion pictures were used for recording the motor reflexes of the animals at various moments of weightlessness and thereafter. The occurrence of the following reactions is established in both operated and intact animals: (1) a "turnover reaction" 4 to 5 sec after the onset of weightlessness, (2) a vestibular reaction stabilizing the position of the head during weightlessness, and (3) a cervix reaction straightening the positions of the head and the body along the longitudinal axis of the animal.

A69-37249

MECHANISMS OF INTERACTION BETWEEN VISUAL AND VESTIBULAR ANALYSORS (K VOPROSU O MEKHANIZMAKH VZAIMODEISTVIIA ERITEL'NOGO I VESTIBULIARNOGO ANALIZATOROV).

N. G. Medvedeva.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO (FIZIOLOGIIA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 68-74. 20 refs. In Russian.

Study of the interrelation between the mechanisms of visual and vestibular analysors in groups of 11 healthy and 47 deaf subjects receiving rhythmic light pulses before and after rotation in a special chair. Changes in the functional state of the visual analysor are studied by simultaneously recording the biopotentials of the retina and the cerebral cortex during the experiments. The possible important role of cortical elements in the interaction between the visual and vestibular analysors is suggested.

EFFECT OF VISUAL STIMULI ON THE NYSTAGMUS ACCORD-ING TO ELECTRONYSTAGMOGRAPHIC DATA FOR TUMORAL POSTERIOR CRANIAL FOSSA (VLIIANIE ZRITEL'NOGO RAZDRAZHENIIA NA NISTAGM, PO DANNYM ELEKTRO-NISTAGMOGRAFII, PRI OPUKHOLIAKH ZADNEI CHEREPNOI IAMKI).

N. S. Blagoveshchenskaia.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 74-81. 17 refs. In Russian.

Encephalographic study of the effect of light stimuli on the nystagmus of a group of 48 patients with various forms of tumoral posterior cranial fossa. Single light flashes and rhythmic light of various intensities and durations, with or without vestibular stimulation by caloric tests, were applied to patients with open and closed eyes. The effect of rhythmic light on the nystagmus was generally more pronounced than the very slight effect of single light flashes.

A69-37251

EFFECT OF PROLONGED SLOW ROTATION ON HEARING (VLIIANIE DLITEL'NOGO MEDLENNOGO VRASHCHENIIA NA

I. Ia. lakovleva, E. I. Matsnev, and V. P. Baranova.
IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR
(FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 81-85. 10 refs. In Russian.

Study of the function of the auditory analysor in a group of subjects prior to and after rotation (1) for 7 days at an angular velocity of 10 deg/sec, or (2) for 3 days at an angular velocity of 40 deg/sec. The functional changes in the auditory analysor in response to acoustic stimuli at frequencies from 125 to 10,000 Hz were greater in the 3-day tests than in the 7-day tests.

A69-37252

ACTION OF A CENTRIFUGAL FORCE ON CALORIC NYSTAGMUS (O DEISTVII TSENTROBEZHNOI SILY NA KALORICHESKII NISTAGM).

KALUHICHESKII MISTAGIIII.
V. A. Kisliakov and I. V. Orlov.
IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR
(FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 86-89, 11 refs. In Russian.

Investigation of the threshold variations in caloric nystagmus in pigeons subjected to accelerations in a head-to-tail direction and vice versa in a centrifuge at various temperatures. The pigeons were kept in a fixed position so that the semicircular canals of their labyrinths would remain horizontal during the experiments. An attempt is made to describe the results in terms of the hydrodynamic behavior of the cupulo-endolymphatic system of a semicircular canal.

A69-37253

SPECIFIC FEATURES OF THE FUNCTIONAL STATE OF THE OTOLITH APPARATUS UNDER CONDITIONS OF ALTERED GRAVITY (OSOBENNOSTI FUNKTSIONAL'NOGO SOSTOIA-NIIA OTOLITOVOGO APPARATA V USLOVIIAKH IZMENEN-NOI VESOMOSTI).

E. M. Juganov and A. J. Gorshkov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBU .ARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov,

Moscow, Izdatel'stvo Nauka, 1968, p. 89-93, 8 refs. In Russian.

Investigation of the function of the otolith apparatus in a total of 248 ground experiments covering a group of 212 persons, subjected to weightlessness and accelerations in a test stand. Galvanometry and a direct otolithometric technique are used in the process, showing that the duration of a nystagmic reaction decreases during weightlessness and increases during acceleration.

A69-37254

MICROELECTRODE STUDY OF THE VESTIBULAR NEURONS OF THE MESENCEPHALON (MIKROELEKTRODNOE ISS-LEDOVANIE VESTIBULIARNYKH NEIRONOV SREDNEGO MOZGA).

I. I. Leshchiniuk and V. A. Kisliakov. IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO (FIZIOLOGIIA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 93-96. 13 refs. In Russian.

Investigation of the activity of a total of 100 vestibular neurons in a group of decerebrized cats subjected to ipsilateral and counterlateral polarization of the labyrinth combined with acoustic and caloric stimulation. Visually controlled microelectrodes were introduced into individual neurons, and the neuron responses were recorded by an oscillograph. It is concluded that neurons receiving afferent pulses from the vestibular apparatus are present in the lower corpus bigeminum.

A69-37255

MICROELECTRODE STUDY OF NEURON REACTIONS IN THE VESTIBULAR NUCLEI OF CATS DURING POLARIZATION AND CALORIC STIMULATION OF THE LABYRINTH (MIKROELEK-TRODNOE ISSLEDOVANIE REAKTSII NEIRONOV VESTI-BULIARNYKH IADER U KOSHKI PRI POLIARIZATSII I KALORICHESKOM RAZDRAZHENII LABIRINTOV).

G. I. Gorgiladze.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR ANALIZATORA). (FIZIOLOGIIA VESTIBULIARNOGO (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 97-110. 36 refs. In Russian.

Study of the reactions of a total of 98 vestibular neurons of a group of 28 cerebellumectomized cats to mono- and biaural polarization and caloric stimulation, separately or in combination, of the ipsilateral and counterlateral labyrinths. KCI-filled glass microelectrodes were introduced into individual vestibular neurons of the anesthetized and curarized cats, and a cathode oscillograph was used for the neuron response recording. Oscillograms of the various types of neuron responses obtained are included. Theories concerning the nature of individual types of responses are proposed.

A69-37256

EXPERIMENTAL STUDY IN THE SIMULATION OF VARIOUS TYPES OF NEURONS (EKSPERIMENTAL'NOE ISSLEDOVANIE PO MODELIROVANIIU NEIRONOV RAZLICHNYKH TIPOV).

V. I. Kii, G. F. Kolesnikov, I. P. Semeniutin, A. N. Razumeev, and V. lu, Davidenko,

PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA **VESTIBULIARNOGO** ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 111-118. In Russian.

Discussion of the applicability of a neuron activity simulation technique to an analysis of the electrical activity of vestibular neurons. The technique was developed by studying the nonlinear characteristics of excitable membranes by the harmonic linearization method. Essential in the technique is a feedback circuit reproducing the functional activity of neurons of various types. The threshold properties of vestibular neurons are studied by recording their responses to direct stimuli in the form of rectangular pulses with a gently sloping trailing edge and sinusoidal pulses. The phenomenon of cathodic depression developing during vestibular neuron responses is noted. The technique is believed to be efficient in overcoming the difficulties usually encountered in electrophysical experiments. V.Z.

A69-37257 //

FUNCTIONAL RELATIONSHIP BETWEEN SEMICIRCULAR CANALS AND THE OTOLITHIC APPARATUS (O FUNK-TSIONAL'NOI SVIAZI MEZHDU POLUKRUZHNYMI KANALAMI I OTOLITOVYM APPARATOM).

A. E. Kurashvili and V. P. Babilak,

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA **VESTIBULIARNOGO** ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 119-123. 8 refs. In Russian.

Study of the combined action of angular and centrifugal acceleration on the motion of human and animal eyes. An increased rate of eye motion in the rotational nystagmus is observed and lasts until the rotation velocity becomes constant. On the basis of these data, an attempt is made to explain the influence of weightlessness

A69-37258

HUMAN SENSORIMOTOR REACTIONS DURING ROTATION IN AN APPARATUS WITH A SMALL RADIUS (SENSOMOTORNYE REAKTSII CHELOVEKA PRI VOZDEISTVII VRASHCHENII NA USTANOVKE S MALYM RADIUSOM).

S. S. Markarian, V. G. Terent'ev, and V. S. Fomin. IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 128-131. In Russian.

Investigation of human sensorimotor reactions during rotation at different speeds and inclinations of the torso. A small-radius stand capable of rotation at 1.5 to 2.0 rps is employed at torso inclinations of 20, 30, 45, 65, 80, and 90 deg to the axis of rotation.

A69-37259 //

THE PROBLEM OF VESTIBULO-VEGETATIVE REFLEXES DURING THE ACTION OF CORIOLIS ACCELERATION (K VOPROSU O VESTIBULO-VEGETATIVNYKH REFLEKSAKH PRI DEISTVII USKORENIIA KORIOLISA).

A. S. Kiselev.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO (FIZIOLOGIIA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 132-136, 7 refs. In Russian.

Results of studies performed on human subjects to investigate the action of Coriolis acceleration on vestibulo-vegetative and vestibulo-somatic reflexes. It is found that the effect of the acceleration is greater when it acts during back-to-front tilting than when it is directed front-to-back, Subjects with a high degree of resistance to Coriolis acceleration exhibited either irregular changes or a complete absence of changes in the pulse and respiration rates. Subjects sensitive to Coriolis acceleration exhibited increased pulse and respiration rates. V.P.M.

A69-37260

INFLUENCE OF PROLONGED ROTATION AND CORIOLIS ACCELERATION ON THE HUMAN VESTIBULAR FUNCTION (VLIIANIE DLITEL'NYKH VRASHCHENII I USKORENII KORIOLISA NA **VESTIBULIARNUIU FUNKTSHU** CHELOVEKA).

R. R. Galle,

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA **VESTIBULIARNOGO** ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 136-141. In Russian,

Study of the vestibular function of humans subjected to angular velocities of 10 and 40 deg per sec in a rotation chamber for up to seven days. The development of the adaptive reactions of the vestibular analysor is discussed on the basis of data from experiments in 10 human beings. More precise tests on human resistance to vestibular influences are suggested.

V.P.M.

A69-37261

STUDY OF HUMAN SLEEP UNDER CONDITIONS OF PRO-LONGED ROTATION (ISSLEDOVANIIA SNA CHELOVEKA V USLOVIIAKH DLITEL'NOGO VRASHCHENIIA).

F. D. Gorbov and V. I. Miasnikov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 141-151. 13 refs. In Russian. Study of the electroencephalograms, the acoustic signal frequency producing a waking reaction, the cutaneogalvanic reflex, and subjective sensations of the deepness of sleep in a group of 5 persons subjected to continuous rotation on a platform during or prior to 8 hr sleep with their heads and feet positioned at the platform edge. It is found that the quality of sleep is not noticeably affected by rotation for 24 hr at an angular velocity of 10 deg/sec but is affected when the duration of rotation is 7 days. Rotation at an angular velocity of 40 deg/sec leads to vestibular-vegetative disorders and causes fatigue.

A69-37262

CERTAIN DYNAMIC CHARACTERISTICS OF THE VESTIB-ULAR ANALYSOR UNDER THE ACTION OF CORIOLIS FORCES (NEKOTORYE DINAMICHESKIE POKAZATELI VESTI-BULIARNOGO ANALIZATORA PRI DEISTVII USKORENIIA KORIOLISA).

V. G. Strelets, V. I. Kopanev, V. M. Babijakh, and S. V. Zhadovskaja.
IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR
(FIZIOLOGIJA VESTIBULIARNOGO ANALIZATORA).
(A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 152-157. 6 refs. In Russian.

Study of the effect of Coriolis accelerations on the heart beat rate and arterial pressure, the vestibular and proprioceptive analysors, the pedographic and ichnographic characteristics, and the headbending aftereffect in a group of 71 trained athletes performing bending motions during steady rotation for 5 min at a rate of ½ rps. The diverse reactions of these physiological and dynamic characteristics of the subjects to Coriolis forces are discussed.

A69-37263

DETECTION OF LATENT FORMS OF MOTION SICKNESS (K VOPROSU O VYIAVLENII SKRYTYKH FORM UKACHIVANIIA).

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 158-162. In Russian.

Study of the complex sensomotor reactions to various visual stimuli in a group of 77 healthy subjects subjected to rocking in a two-bar Khilov rocker for 60 min or to the point of where slight nausea symptoms occur within this period. A reduced speed of sensomotor reactions (in the absence of vegetative disorders) and impaired performance, interpreted as a symptom of latent motion sickness, are established in roughly 10 per cent of the subjects. V.Z.

A69-37264

RELATION BETWEEN THE FUNCTIONAL TOLERANCE OF THE VESTIBULAR ANALYSOR AND THE STATE OF ARTERIAL PRESSURE DURING ROCKING (O VZAIMOSVIAZI FUNKTSIONALNOI VYNOSLIVOSTI VESTIBULIARNOGO ANALIZATORA I SOSTOIANIIA ARTERIAL'NOGO DAVLENIIA PRI UKACHIVANII).

D. A. Pigulevskii and M. I. Nikol'skaia.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 162-167. 15 refs. In Russian. Investigation of the relation between the function of the vestibular analysor and the arterial pressure during otolith stimulation experiments on a group of 730 subjects both susceptible and nonsusceptible to motion sickness. A relation between the functional tolerance of the vestibular analysor and arterial pressure during rotation is established. Arterial hypotonia is found to contribute to the proneness to motion sickness.

A69-37265

THE ROLE OF THE ADAPTATION FUNCTION OF SYMPATHETIC INNERVATION IN MOTION SICKNESS PROPHYLAXIS (O ROLI ADAPTATSIONNOI FUNKTSII SIMPATICHESKOI INNERVATSII PRI PROFILAKTIKE UKACHIVANIIA).

V. P. Fomina-Kosolapova,

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 167-173. 15 refs. In Russian. Investigation of the effects of adrenalin, ephedrine, sympatholytin, piperoxane, and pyridoxyphene injections on the mystagmus and respiration in a total of 71 experiments on a group of 12 rabbits subjected to rotation. It is found that adrenalin and ephedrine injections generally reduced the rate and duration of the postrotational nystagmus while sympatholytin, piperoxane, and pyridoxyphene produced the opposite effect on the nystagmus but reduced the respiration rates of the rabbits during rotation to an almost normal level.

A69-37266

VESTIBULAR TRAINING OF TEST PILOTS BY PASSIVE METHODS (VESTIBULIARNAIA TRENIROVKA ISPYTATELEI PASSIVNYMI METODAMI).

N. I. Popov, F. A. Solodovnik, and G. F. Khlebnikov. IN: PHYSIOLOGY OF THE VESTIBULAR

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 173-177. 11 refs. In Russian.

Discussion of the results of a training program under which a group of prospective test pilots underwent adaptation to (1) rotation with or without an unstable support, (2) rotation with a bowing motion of the head and body, (3) rocking and balancing in a test chair, and (4) complex vestibular and visual stimulation in a rotating cylinder. A higher tolerance to all these stimuli was achieved in all subjects after completion of this training program.

V.Z.

A69-37267

NONSPECIFICITY OF VESTIBULAR TRAINING (O NESPETSIFICHNOSTI VESTIBULIARNOI TRENIROVKI).

B. B. Bokhov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA), (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 177-181. 18 refs. In Russian. Study of the adaptation of the nystagmus of a group of nine rabbits to rotation at rates from 10 to 180 deg per sec. It is found that the nystagmic reaction of rabbits to weaker and stronger stimuli decreased after a previous adaptation to a certain intermediate stimulus within this range.

A69-37268

EFFECT OF ROCKING ON THE FUNCTIONAL STATE OF THE SYSTEM HYPOPHYSIS-ADRENAL CORTEX (VLIIANIE UKA-CHIVANIIA NA FUNKTSIONAL'NOE SOSTOIANIE SISTEMY GIPOFIZ-KORA NADPOCHECHNIKOV).

N. I. Kostrov and O. A. Nakapkin.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR **VESTIBULIARNOGO** (FIZIOLOGIIA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 182-185. 11 refs. In Russian. Investigation of the effect of vestibular stimulation on the blood composition in a group of 47 healthy individuals subjected to 15-min rocking on a Khilov rocking stand. A distinct decrease in the blood eosinophile content occurs in the subjects 4 hr after the rocking. A similar effect, observed after the administration of the adrenocorticotropic hormone, is believed to indicate the participation of the hypophysis and the adrenal cortex in the reaction of the organism to

A69-37269

MOTION SICKNESS IN DOGS BEFORE AND AFTER INTRA-VENOUS ADMINISTRATION OF SODIUM HYDROCARBONATE (BOLEZN' DVIZHENIIA U SOBAK DO I POSLE VNUTRIVEN-NOGO VVEDENIIA GIDROKARBONATA NATRIIA).

A. G. Kuznetsov and V. N. Barnatskii.
IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 185-188. In Russian.

Investigation of the prophylactic action of sodium hydrocarbonate on the development of motion sickness in a group of three dogs subjected to linear vertical accelerations. A positive prophylactic effect is obtained after intravenous administration of two 10 ml doses of 5% sodium hydrocarbonate over a two week period. Less frequent and weaker symptoms of motion sickness and a lower bioelectrical activity of the stomach and its nervous system are observed in the experimental dogs after injections.

A69-37270 //

THE ACCELERATION-DECELERATION-TILT TEST-ITS SIG-NIFICANCE FOR FUNCTIONAL INVESTIGATION AND TRAIN-ING OF THE VESTIBULAR ANALYSOR (TEST UZN, EGO ZNACHENIE DLIA FUNKTSIONAL'NOGO ISSLEDOVANIIA I TRENIROVKI VESTIBULIARNOGO ANALIZATORA).

A. Kh. Min'kovskii.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO (FIZIOLOGIIA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 189-194. 16 refs. In Russian. Study of the quantitative and qualitative features of vestibulosomatic, vegetative, and sensory reactions observed as a result of the application of predetermined amounts of angular acceleration, deceleration, and tilting. Different planes were employed to ensure accurate evaluation of the functional state of the vestibular analysor. The possibility of adequate action on individual parts of the vestibular analysor makes the test effective for use during the training of sportsmen.

A69-37271

SOME REFLEXES OF SEMICIRCULAR CANALS AS APPLIED TO THE PROFESSIONAL SELECTION AND APPRAISAL OF THE FLIGHT CREW (NEKOTORYE REFLEKSY POLUKRUZHNYKH KANALOV PRIMENITEL'NO K PROFOTBORU I EKSPERTIZE LETNOGO SOSTAVA).

V. I. Babiiak.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO (FIZIOLOGIJA ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 194-199. 5 refs. In Russian.

Investigation of the vestibular function with the aid of positive and negative angular accelerations of 20 deg per sec. The evaluation of the reaction was carried out by analyses of the illusory perceptions and nystagmus. A definite connection between illusion and nystagmus was found, and the phase character of the changes of analyzable indices is stressed. It is pointed out that the study of illusions in combination with nystagmography can be used for medical appraisal of flight personnel,

A69-37272

EVALUATION OF THE RAPID COMPONENT OF NYSTAGMUS IN NYSTAGMOGRAPHIC STUDIES (OTSENKA BYSTROGO KOMPONENTA NISTAGMA V NISTAGMOGRAFICHESKIKH ISSLEDOVANIIAKH).

M. M. Levashov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR VESTIBULIARNOGO ANALIZATORA). (FIZIOLOGIIA (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 199-203, 10 refs. In Russian. Study of the nature of the rapid component of nystagmus using photonystagmography. A quantitative description of the rapid component is given. It is shown that the rapid component depends on the afferent pulse of the ampullar apparatus.

A69-37273

ELECTRONYSTAGMOGRAPHY AND ITS PROSPECTS (ELEK-TRONISTAGMOGRAFIIA I EE PERSPEKTIVY).

A. E. Kurashvili and V. I. Babiiak.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 203-209, 13 refs. In Russian. Appraisal of electronystagmography as an accurate and simple method for recording the movements of the eye. The technique can be utilized in studies of pathological states in the vestibular analysor, It can be employed to determine the relationship between oculomotor nuclei and vegetative centers and to study the interaction between the vestibular and visual analysors. V.P.M.

A69-37274

NEW EQUIPMENT FOR STUDYING THE VESTIBULAR ANA-(NOVYE USTANOVKI DLIA ISSLEDOVANIIA VESTIBULIARNOGO ANALIZATORA).

V. N. Barnatskii, A. G. Kuznetsov, G. F. Nikolashin, and Iu. N. Sushkov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20:04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 209-211, 8 refs. In Russian.

Suggestions for equipment which eliminates the horizontal component of acceleration with the aim of reducing to a minimum the stimulation of the semicircular canals during studies of the vestibular analysor. The equipment is used to study optokinetic stimuli.

A69-37275 #

METHODS OF STUDYING THE VESTIBULAR FUNCTION ON A SPACECRAFT (K VOPROSU O METODAKH IZUCHENIIA VESTIBULIARNOI FUNKTSII V KOSMICHESKOM KORABLE). A, D. Matveev and M. D. Emel'ianov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 212-223. 105 refs. In Russian. Outline of methods using the motions of an astronaut's head and body and the rotation of the spacecraft as the adequate vestibular stimuli for studying the function of the vestibular analysor during weightlessness. It is indicated that the cumulative effects of Coriolis forces during the development of motion sickness can be effectively studied by these methods. The use of calorization and of galvanic and pulsed currents with various current-voltage characteristics as inadequate stimuli is considered. The importance of combined tests with encephalogram, myogram, and oculogram recordings is stressed. Special vertical-writing and visual-image tests are suggested for studying the spinal vestibular reflexes during

weightlessness. Techniques and equipment for performing these tests

A69-37276 #

are described.

IMPORTANCE OF PARABOLIC FLIGHTS, REPRODUCING A BRIEF WEIGHTLESSNESS, IN THE VESTIBULAR PROFESSION-AL SELECTION OF ASTRONAUTS (K VOPROSU O ZNACHENII PARABOLICHESKIKH POLETOV S VOSPROIZVEDENIEM KRATKOVREMENNOI NEVESOMOSTI V VESTIBULIARNOM PROFOTBORE KOSMONAVTOV).

I. A. Kolosov, V. I. Lebedev, G. F. Khlebnikov, and I. F. Chekirda. IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 223-227. 15 refs. In Russian.
Investigation of the behavior of the sensory (subjective responses) and vegetative (heart beat, respiration, general hyper-hydrosis) components during parabolic flights with brief weightlessness in a large group of subjects who passed standard professional vestibular tests. It is concluded that the proneness to motion sickness can be revealed by these additional weightlessness tests.

V.Z.

A69-37277

SIGNIFICANCE OF SOME VESTIBULOMETRIC TESTS IN THE FLIGHT SURGEON'S APPRAISAL OF PERSONS PREDISPOSED TO ILLUSORY SENSATIONS DURING FLIGHT (ZNACHENIE NEKOTORYKH VESTIBULOMETRICHESKIKH PROB PRI VRACHEBNO-LETNOI EKSPERTIZE LITS, PREDRAS-POLOZHENNYKH K ILLIUZORNYM OSHCHUSHCHENIIAM V POLETE).

1. A. Sidel'nikov and 1. I. Brianov.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 228-234, 21 refs. In Russian. Discussion of the qualities of a test program designed as a basis for the flight surgeon's appraisal of flying personnel. The program is applied to a group of 86 pilots of various types of aircraft including ones with a predisposition to illusory sensations during flight. Included in the program are hinged chair tests and rotation tests to determine responses of the vestibular apparatus with open and closed eyes, as well as an optokinetic test inside a striped rotating cylinder. The test program is assessed positively as a means of singling out persons who are prone to illusory sensations in flight.

A69-37278 #

COMPARATIVE EVALUATION OF VESTIBULOMETRIC EXAM-INATION METHODS USED IN PROFESSIONAL SELECTION (SRAVNITEL'NAIA OTSENKA VESTIBULOMETRICHESKIKH METODOV OBSLEDOVANIIA, PRIMENIAEMYKH V TSELIAKH PROFOTBORA).

S. R. Raskatova.

IN: PHYSIOLOGY OF THE VESTIBULAR ANALYSOR (FIZIOLOGIIA VESTIBULIARNOGO ANALIZATORA). (A69-37240 20-04)

Edited by V. V. Parin and M. D. Emel'ianov.

Moscow, Izdatel'stvo Nauka, 1968, p. 235-240. In Russian.

Discussion of the qualities of some vestibulometric tests as a basis for the flight surgeon's appraisal of applicants in the flying profession. A test proposed by Brianov, according to which the vestibular system is subjected to a cumulative load of Coriolis forces, is compared with conventional tests on a group of 153 flyers, students, and applicants. The efficiency of a two-minute Coriolis force endurance test is indicated.

V.Z.

A69-37339 #

EXPOSURE TO RADIATION IN ORBITAL FLIGHTS (ZUR STRAHLENEXPOSITION BEI ORBITALFLÜGEN).

Hans Swart.

Astronomie und Raumfahrt, no. 2, 1969, p. 58-61. 6 refs. In German,

Assessment of the magnitude of exposure to radiation during orbital flight, in view of the possible adverse effect on personnel manning space stations and laboratories. Tables of expected radiation dose rates are included. Suggestions are made concerning the proper shielding for personnel exposed to radiation doses of 25 rem or more.

V.P.M.

A69-37567 •

ATP ASSAY OF TERRESTRIAL SOILS—A TEST OF AN EXOBIOLOGICAL EXPERIMENT.

N. H. MacLeod, E. W. Chappelle, and A. M. Crawford (NASA, Goddard Space Flight Center, Greenbelt, Md.).

Nature, vol. 223, July 19, 1969, p. 267, 268. 13 refs.

Determination of the adenosine triphosphate (ATP) content of a variety of soils in order to define some of the problems associated with the measurement of ATP in soil-like material which may be encountered on Mars, for example. The ATP content of 25 terrestrial soil samples was estimated by the firefly luciferase assay, which is considered to be a feasible tool for exobiological work. ATP, the central molecule of bioenergetic reactions, occurs in all terrestrial organisms.

A69-37577 •

NEW OBSERVATIONS ON THE SUBSTRATE SPECIFICITY OF CATHEPSIN C (DIPEPTIDYL AMINOPEPTIDASE I) INCLUDING THE DEGRADATION OF β -CORTICOTROPIN AND OTHER PEPTIDE HORMONES,

J. Ken McDonald, Benjamin B. Zeitman, Thomas J. Reilly, and Stanley Ellis (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

Journal of Biological Chemistry, vol. 244, May 25, 1969, p. 2693-2709, 65 refs.

Experimental investigation of the substrate specificity of cathepsin C derived from rat liver. It was found that, compared to bovine spleen cathepsin C in acrylamide gel electrophoresis, the rat liver enzyme behaved as a more acidic protein, and showed evidence of a polymeric structure as indicated by its apparent dissociation to subunits in the presence of sodium dodecyl sulfate. M.M.

ON THE PROTECTIVE ACTION OF HIP SAFETY BELTS IN VEHICLES.

Franz Ollendorff (Technion-Israel Institute of Technology, Faculty of Electrical Engineering, Haifa, Israel).

IN: CONTRIBUTIONS TO MECHANICS, (A69-37580 20-32) Edited by David Abir.

Oxford, Pergamon Press, Ltd. (Markus Reiner Eightieth Anniversary Volume), 1969, p. 243-258.

Quantitative study of the impact mechanism and its effect on the behavior of the human body. Tests using a model strapped to a seat by a hip belt are described. The rod vibration is represented by the partial differential equation for rod vibrations. The equation is integrated by means of the theory of functions, allowing for the initial and boundary conditions dictated by the previous equilibrium. The resultant motion is derived for the natural oscillations of the upper part of the body. On the basis of certain plausible assumptions as to the elasticity parameters involved, it is found that speeds as low as 15 km/hr lead to dangerous displacement of the head in the case of instantaneous braking. Even an assumption of 1/2 sec braking time does not raise the permissible maximum speed above 36 km/hr. It is shown that the brain is subject to an acceleration of 5 g, while the internal organs undergo severe mechanical stress. It is concluded that hip belt protection under these conditions is inadequate. The method of analysis is applicable to the study of other protective devices. It is conjectured that a belt around one or both shoulders would be more effective than a hip belt.

A69-37602

A RHEOLOGICAL APPROACH TO RESEARCH IN MICROCIRCULATION.

K. Weissenberg (Royal Institution of Great Britain, London, England).

IN: CONTRIBUTIONS TO MECHANICS. (A69-37580 20-32) Edited by David Abir.

Oxford, Pergamon Press, Ltd. (Markus Reiner Eightieth Anniversary Volume), 1969, p. 437-445.

Review of some of the phenomena encountered in the flow of biological materials. The great variety of materials to be considered by modern rheology is discussed. Microcirculation and macrocirculation are described as two mutually dependent and complementary components of one and the same flow of matter and energy which preserves the intrinsic unity of the living body. The problem of finding suitable instrumentation for the quantitative observation of all variables of interest is investigated, and the task of incorporating the observations into the mathematical framework of a theory is considered.

G.R.

A69-37612

LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS.

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac (Rochester, University, Rochester, N.Y.) and F. G. Favorite.

Amsterdam, North-Holland Publishing Co., 1969. 220 p. \$14.10.

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RELEASE OF MICROBIAL CONTAMINATION FROM FRACTURED SOLIDS. N. J. Petersen (U.S. Public Health Service, Phoenix, Ariz.), R. G. Cornell (Florida State University, Tallahassee, Fla.), and J. R. Puleo (U.S. Public Health Service, Cape Kennedy, Fla.), p. 19, 20. (See A69-37614 20-04)

DISCUSSION OF A POSSIBLE CONTAMINATION OF SPACE WITH TERRESTRIAL LIFE. H. Bücker and G. Horneck (Frankfurt, Universität, Frankfurt am Main, West Germany), p. 21-27. 9 refs. (See A69-37615 20-04)

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ORGANIC GEOCHEMICAL INVESTIGATIONS IN RELATION TO THE ANALYSES OF RETURNED LUNAR ROCK SAMPLES. B. Nagy and H. C. Urey (California, University, La Jolla, Calif.), p. 31-46. 20 refs. (See A69-37616 20-04)

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(New York State, Dept. of Health, Albany, N.Y.), p. 67, 68.
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VESTIBULAR ANALYZER AS A CRITICAL ORGAN IN THE EVALUATION OF RADIATION HAZARDS DURING SPACE FLIGHTS. Iu. G. Grigoriev, p. 173-185. (For abstract see issue 15, page 2719, Accession no. A68-31952)

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A69-37613

THE EFFECTS OF HIGH INTENSITY VISIBLE AND ULTRA-VIOLET LIGHT ON THE DEATH OF MICROORGANISMS.

C. O. Chichester and W. A. Maxwell (California, University, Davis, Calif.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

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Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 11-18. 9 refs.

The expectation that microorganisms would be exposed to very high visible light intensity in a space environment led to the investigation of the killing of microorganisms by visible light. The carotenoid-containing yeast Rhodotorula glutinis was one of the several organisms investigated. It was found that despite the carotenoid content of the organism it can be killed by endogenous photosensitized oxidation. Particular emphasis was placed upon the development of action spectrum, determination of sites of action, and the mechanism by which cells are killed. The portion of the spectrum responsible for lethality lies between 300 and 400 nm with an apparent maximum response around 390 nm. The nucleus appeared to be damaged, as evidenced by a mutagenic effect when cells were radiated with light above 300 nm. Previously the only reported mutagenic responses from light of these wavelengths have been noted when cells have been irradiated in the presence of added sensitizing dyes. Increased leakage of irradiated cells indicated permeability membranes have undergone damage. Overall respiration of the cells is also decreased at a rate corresponding to the loss in viability. Such random damage to cells indicates that whatever the damaging species is, it must be quite nonspecific. The sensitizing agent could be a free radical and evidence has been developed to support such a proposal. The sulfhydryl-containing compounds cysteine and gluthathione are capable of protecting the cells from death. Since these compounds are known to protect the organisms from ionizing radiation by the trapping of free radicals, it is logical to presume that the damaging species is a free radical. Little or no protection is offered to the microorganism by fat-soluble antioxidants such as tocopherol and related species. This would indicate that the primary lethal site must be in the water phase. It is likely that dehydration of the cells would initially increase their susceptibility to irradiation, but upon intense dehydration could also result in their increased resistance. (Author)

A69-37614

RELEASE OF MICROBIAL CONTAMINATION FROM FRACTURED SOLIDS.

N. J. Petersen (U.S. Public Health Service, Phoenix, Ariz.), R. G. Cornell (Florida State University, Tallahassee, Fla.), and J. R. Puleo (U.S. Public Health Service, Cape Kennedy, Fla.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 19, 20.

Study of the probability of release of microbial contamination from the interior of solids upon fracture due to impact. A model system was designed in which known concentrations of bacterial spores were incorporated in methyl methacrylate plastic. Pieces of plastic were fractured in a uniform manner exposing interior surface areas of consistent and measurable size. Known surface areas were incubated in sets of 20 culture tubes containing liquid growth medium. The subsequent occurrence of visible growth expressed as per cent of tubes positive was interpreted as an estimate of the probability of release of at least one viable microorganism. From these experiments probability of release as a function of microbial concentration in plastic was estimated for exposed interior surface areas of 31, 62, 93, and 124 sq mm. Good agreement of the empirical results with a theoretical mathematical model of the probability of release of contamination from solids was demonstrated. Analysis of the data using the maximum likelihood procedure provided a means of calculating a proportionality constant representing the effective thickness of the exposed area and the characteristics of the recovery procedure. The value of this constant will be used in the mathematical model for spacecraft destined for planetary exploration.

A69-37615

DISCUSSION OF A POSSIBLE CONTAMINATION OF SPACE WITH TERRESTRIAL LIFE.

H. Bücker and G. Horneck (Frankfurt, Universität, Arbeitsgruppe für biophysikalische Weltraumforschung, Frankfurt am Main, West Germany).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 21-27. 9 refs. Research supported by the Bundesministerium für Wissenschaftliche Forschung.

Theoretical study of forces and energies affecting a particle the size of a microorganism near the earth. A transfer of terrestrial life to other celestial bodies seems impossible unless it is done by a spacecraft. This possibility cannot be excluded even after sterilization of the spacecraft on earth, for in higher layers of the atmosphere the spacecraft could be contaminated again. In this case, microorganisms would be subjected to a space flight where decompression is much slower initially than is the case on leaving the earth's surface with the spacecraft. With these considerations, experiments on microorganisms were carried out in a vacuum chamber. For testing the effect of vacuum on the rate of desorption, mainly of water, measurement was made by a mass spectrometer. In the experiments, the decompression rate was varied and different microbiological forms were used, namely, spores and vegetative cells of different cell wall structures. Further experiments in the ultrahigh-vacuum range are necessary, and the problems involved are discussed. (Author)

A69-37616 •

ORGANIC GEOCHEMICAL INVESTIGATIONS IN RELATION TO THE ANALYSES OF RETURNED LUNAR ROCK SAMPLES.

Bartholomew Nagy and Harold C. Urey (California, University, La Jolla, Calif.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND

MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

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Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 31-46. 20 refs. Grants No. NsG-341; No. NsG-541; No. NGR-05-009-043.

Analysis of the organic matter in carbonaceous meteorites and in early Precambrian sedimentary rocks in order to refine and develop analytical microtechniques suitable for the analysis of lunar rock samples when they become available. These two types of samples were selected because (1) carbonaceous meteorites constitute, at present, the only available extraterrestrial matter that contains organic substances and (2) the organic matter in early Precambrian rocks may be the remnants of either very primitive life or prebiological organic matter. The samples are at first extracted with organic solvents to remove soluble substances and are then ozonized in order to solubilize the major organic constituent, which is in the form of an insoluble "polymer-like" substance. After several chemical steps involving solvent extraction, elution chromatography, and esterification of the saponifiable fraction, the substances are analyzed by combined capillary gas chromatography and mass spectrometry. It is interesting to note that the insoluble "polymerlike" fraction of both the carbonaceous meteorites and the terrestrial rocks contained aromatic constituents, although in the Precambrian samples the aromatics seem to be less common than in the meteorites. The origin of these and other compounds is still unknown in both samples. Microscopic and scanning electron microscopic examinations of both samples revealed well defined, spheroidal microstructures of unknown origin. In view of the fact that the Surveyor experiments showed the presence of basalt on the moon, extreme caution will be necessary in interpreting the origin of any microstructures that may be found in lunar matter, because round objects, showing "double-walls" and other cell-like morphologies but of unequivocally nonbiological origin were found in early Precambrian basalts. (Author)

A69-37617 •

EFFECTS OF RADIATION DURING SPACE FLIGHT ON MICRO-ORGANISMS AND PLANTS ON THE BIOSATELLITE II AND GEMINI XI MISSIONS.

Frederick J. de Serres (Oak Ridge National Laboratory, Oak Ridge, Tenn.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04) Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biochemistry, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 62-66.

NASA-AEC-sponsored research.

Results of recent experiments with the lysogenic bacteria Escherichia coli and Salmonella typhimurium, the bread mold Neurospora crassa, and the flowering plant Tradescantia on the Biosatellite 2 and Gemini 11 missions. In the lysogenic bacteria experiment, significant effects of space flight were found on both growth rate and the induction of prophage. In that part of the Neurospora experiment utilizing nondividing and inactive spores, no difference was found in the genetic effects of radiation between the flight and ground samples. In that portion of the Neurospora experiment utilizing rapidly metabolizing spores, the genetic effects of radiation were less serious in the flight samples than the ground samples. In the Tradescantia experiment, the irradiated flight material, in general, produced increased rates of cell death, abortion of pollen, loss of reproductive integrity, as well as other

abnormalities in cell structure and function. In some of the experiments, there were found significantly genetic effects of space flight alone, and the enhancement of various genetic effects of radiation under weightlessness was no more than two- or three-fold.

(Author)

A69-37618 *

MUTATIONAL RESPONSES OF INSECTS IN THE BIOSATEL-LITE II EXPERIMENT.

R. C. von Borstel, Roger H. Smith, A. R. Whiting (Oak Ridge National Laboratory, Biology Div., Oak Ridge, Tenn.), D. S. Grosch (North Carolina State University, Dept. of Genetics, Raleigh, N.C.), Luolin S. Browning (William Marsh Rice University, Genetics Research Laboratory, Houston, Tex.), Irwin I. Oster (Bowling Green State University, Dept. of Biology, Bowling Green, Ohio), John V. Slater, and Brenda Buckhold (California, University, Donner Laboratory of Medical Physics, Berkeley, Calif.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 70-76. 12 refs. NASA-AEC-sponsored research.

Genetic effects associated with space flight include mutation induction by the space flight itself and enhancements or antagonisms of radiation-induced mutations. The conditions of space flight vary in mutagenic effectiveness from no response at all to responses nine times that found in ground-based controls. The test systems follow the sensitivity pattern from spermatogonial translocations to oogonial and oocyte nondisjunction to recessive lethality of stages in spermatogenesis to dominant lethality of stages in spermatogenesis. Large enhancing and antagonistic effects of space flight in conjunction with radiation were observed in the Biosatellite 2 experiment. The most surprising one was the elimination of the effect of 2500 R by space flight in Habrobracon oogonia where the effects of 500 R normally can be easily observed. Two sets of parameters are considered in attempts to explain the responses: (1) the nature of the biological targets and (2) the particular conditions of space flight that are responsible for the effects. (Author)

A69-37619

BIOSATELLITE II-PHYSIOLOGICAL AND SOMATIC EFFECTS ON INSECTS.

Brenda Buckhold (California, University, Berkeley, Calif.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 77-83. 6 refs.

Discussion of data obtained on physiological and somatic effects on insects with the first successful biosatellite to contain an onboard radiation source. Wasps, beetles, and fruit flies have demonstrated positive effects of the space flight alone or in combination with irradiation. In the flour beetle, *Tribolium confusum*, the incidence of a developmental wing abnormality was measured. This abnormality, which mimics the mutation known as "split," was significantly

increased in beetles which were flown as young pupae, preirradiated with X rays to bring them into their sensitive dose range and gamma-irradiated during flight. Wing abnormalities increased from a ground value of 29.9 per cent to a value of 44.8 per cent.

G.R.

A69-37620

RECIPROCITY IN GEOTROPIC RESPONSE AND ACCELERATION CONSTRAINTS OF THE BIOSATELLITES.

J. Shen-Miller (Argonne National Laboratory, Argonne, III.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 93, 94.

Determination of the acceleration thresholds for the geotropic response of oat seedlings grown in a two-axis clinostat. This apparatus enables the continuous imposition of a centrifugal force on the seedling while at the same time nullifying, or compensating for, the effect of the directional component of gravity. For a three-day exposure, the threshold acceleration was about 1 mg for the shoot and .1 mg for the root. Since monocot organs are among the more geosensitive, the maximum in-orbit acceleration programmed for the biosatellites, .01 mg, appears conservative by an order of magnitude. But geotropism of plants grown in normal orientation under earth gravity follows the reciprocity rule-that is, for a threshold growth response to transverse acceleration, the product of the stimulation force and time is a constant. If reciprocity is followed under free-fall conditions, then in-orbit accelerations of relatively high magnitude could be accepted as long as the force-time product was below the reciprocity constant. Accordingly, the above clinostat was used to determine if reciprocity in geotropism holds for plants grown under continuous gravity compensation, and if so, the value of the constant. Over the acceleration range examined, 0.08 g to 3 g, reciprocity was found in the georesponse of shoots of compensated oat seedlings. The constant, derived from exposure-response curves, is 100 gravity-sec at 28 deg C. For plants, in-orbit vehicular accelerations higher than those previously permitted might be acceptable if such accelerations are of brief duration. (Author)

A69-37621

STUDIES OF HUMAN ADAPTATION TO SPACE FLIGHT EFFECTS UNDER LOW-CALORIE DIET CONDITIONS.

P. P. Ivanov, Iu. G. Nefiodov, A. S. Ushakov, L. I. Kakurin, K. A. Lariecheva, I. G. Vysotskii, and Iu. V. Latova.

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 99-101.

Results of experiments performed to establish the activity and performance of man kept on a low-calorie (1800) diet and exposed to some space flight effects. The diet consisted of canned foods with an optimal proportion of basic nutrients and amino acids. Three series of experiments were carried out on 18 healthy male subjects. Each series involved pre- and posttest examinations and 15-day tests.

The first series dealt with the effect of low-calorie diets as such, the second one covered the effect of low-calorie diets combined with bed rest, and the third series revealed the above effect aggravated by exposing test subjects to bed rest and acceleration. In the course of the experiments, the state of the central nervous and cardiovascular systems, the function of external respiration, the digestine function, the kinesthetic apparatus, metabolic processes, and immunological resistance of the body were studied. In addition, test subjects underwent thorough clinical examinations. (Author)

A69-37622 •

INTESTINAL HYDROGEN AND METHANE OF MEN FED SPACE

D. Howes Calloway and E. L. Murphy (California, University, Berkeley, Calif.)

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 102-109. Contract No. NAS 9-3966.

Intestinal bacteria form hydrogen and methane that could constitute a fire hazard in a closed chamber. Several factors affect gas formation: (1) amount and kind of fermentable substrate; (2) abundance, types, and location of microflora; and (3) psychic and somatic conditions that affect the gut. The first factor was evaluated by studying men fed different diets. One group of six men ate Gemini-type diet (S), and another received a bland formula (F) for 42 days. Breath and rectal gases were analyzed during the first and final weeks. Flatus gases varied widely within dietary groups but much more gas was generated with diet S than with F. In the first 12-hour collection, subjects fed S passed 3 to 209 ml (ATAP) of rectal hydrogen and 24 to 156 ml from the lungs (assuming normal pulmonary ventilation). With F, these values were 0 to 3 ml and 6 to 36 ml. Subjects were calmer during the second test. Gas production was lower with S than initially; F values were unchanged. Methane differed idiosyncratically, presumably due to differences in flora. Computed from 12-hr values, maximum potential daily hydrogen and methane are per man: for S, 730 ml and 382 ml; for F, 80 and 222 ml. Volumes would be larger at reduced spacecraft and suit (Author) pressures.

A69-37623 •

CURRENT RESEARCH ON REGENERATIVE SYSTEMS.

Jacob Shapira, Adrian D. Mandel, Phillip D. Quattrone, and Nancie L. Bell (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North-Holland Publishing Co., 1969, p. 123-129. 11 refs.

Summary of multiple studies directed toward the development of a regenerative life support system, showing that easily synthesized organic compounds and microbiological materials are potentially

capable of being used as foods for long-duration space missions. The organic compounds presently believed to offer the greatest potential are glycerol, simple glycerol derivatives such as triacetin, and formose sugars. Laboratory studies indicate that glycerol can be synthesized from formaldehyde, which in turn is obtained by the direct catalytic oxidation of methane, a by-product of the Sabatier reaction used in spacecraft atmosphere control systems. Formose sugars are derived from the self-condensation of formaldehyde. Mixtures of glycerol and triacetin have been shown to be suitable as a major component of diets fed to weanling rats for prolonged periods. These compounds do not exist as stereoisomers and therefore offer advantages over the formose sugars. An automated system for the continuous autotrophic production of Hydrogenomonas eutropha bacteria is in operation, and the nutritional requirements for growth in the system using urea as a nitrogen source, are being studied. Nutritional evaluation of Hydrogenomonas bacteria has shown that they are capable of supplying the total protein requirement of growing rats for prolonged periods. The potential and problems of these regenerative systems and the prospects for the accomplishment of a totally regenerative food system will be discussed.

A69-37624

THE PROBLEM OF STERILIZING A LIFE-SUPPORT SYSTEM IN BIOSATELLITE EXPERIMENTS OVER ONE YEAR.

Robert G. A. Lotz (Frankfurt, Universität, Frankfurt am Main, West Germany).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 130-133. 5 refs.

Special efforts are necessary to sterilize the life-supported system for experimental animals in biosatellite experiments over one year in duration. The energy requirements needed are relatively high, and the energy which is available in biosatellites at the present time is a limiting factor, particularly in long-term experiments. It is shown that these difficulties are overcome by the selection of an appropriate experimental animal. Thus, it was possible to prepare a long-term satellite experiment. (Author)

A69-37625

OXYGEN SUPPLY AND CARBON DICKIDE ABSORPTION IN LONG-TERM LIFE-SUPPORT SYSTEMS.

Robert G. A. Lotz and Manfred E. A. Fuchs (Frankfurt, Universität, Frankfurt am Main, West Germany).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 134-137.

Long-term experiments with animals in space require a life-support system that provides optimal conditions of life at lowest energy demand. Experimental studies of different physicochemical and biological systems are compared. While such experiments are limited by energy requirements, it is possible to choose a certain system by comparing the exact energy balances of the different ecological systems. (Author)

PHOTOSENSITIZING EFFECT OF CATIONS ON AMINO ACIDS AND PEPTIDES.

N. P. Bogdanova and M. A. Khenokh.

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 141-148. 10 refs

In connection with a study of the chemical evolution of abiogenically synthesized organic compounds, this work reports experimental results obtained by the photolysis of solutions of aliphatic amino acids (glycine, alanine, valine, leucine, n. leucine) and peptides in air, nitrogen, Ar, and carbon dioxide in the presence of the most simple photocatalyzers-cations of sulphates. The evidence shows that the photochemical conversion of amino acids depends on the content of the atmosphere. The decay of the amino group is most active in air. Nitrogen and Ar exert no significant influence on deamination, whereas in the atmosphere of carbon dioxide the formation of ammonia in valine, for example, was only 29 per cent of its total amount during photolysis in the air. The formation of acetaldehyde during alanine photolysis was inhibited in Ar and carbon dioxide. Oxydative processes inducing the formation of glyoxalic acid and formaldehyde were sharply inhibited in Ar, nitrogen, and carbon dioxide. Under the influence of UV light, the decay of amino acids is also accompanied by the formation of new amino acids. The photosensitizing effect of cations induces a rupture of CO-NH-bonds in peptides and, provided heavy radiation doses, prevents the formation of new amino acids. The longer the dipeptide chain, the more significant the quantum yield of its decomposition. The photolysis of dipeptides, leading to their decay, does not necessarily induce a hydrolytic rupture of CO-NH-bonds resulting in the formation of three amino acids. (Author)

A69-37627

RESISTANCE OF THE PROTOZOON COLPODA MAUPASI TO MARTIAN CONDITIONS OF ATMOSPHERIC PRESSURE AND LOW PARTIAL PRESSURE OF OXYGEN.

L. K. Lozina-Lozinskii and V. N. Bychenkova,

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 149-155.

Among the most important factors limiting the active life of animal organisms in Martian conditions are low atmospheric pressure and insignificant amounts of oxygen in the atmosphere. The experiments with the aerobic protozoon *C. maupasi* have shown that in conditions of hermetically sealed chambers the protozoon can survive for a long time and can reproduce in an atmosphere of air nitrogen containing 1 or 0,0005 per cent oxygen at a pressure from 15 mm Hg and higher. The atmospheric pressure of 10 mm Hg reveals a considerable decrease in the survival percentage and no reproduction. The exposure to 5 mm Hg resulted in a 100 per cent mortality of the protozoon. In a specially constructed chamber where atmosphere pressure was automatically maintained during an experiment of many days, the reaction of the infusoria was

somewhat different; they reproduced and existed not only at the pressure of 10-15 mm Hg, but also at 5 mm Hg, in an atmosphere of both air and nitrogen containing from 1 to 0.0005 per cent oxygen. This indicates not only low-oxygen consumption of unicellular animals but also the capability of cells to extract some traces of the gas from the atmosphere. Low pressure and some traces of oxygen in the Martian atmosphere are not an impediment for the existence of some of the earth's animals. (Author)

A69-37628

CHARACTERISTICS OF BIOLOGICAL EFFECTS OF COSMIC RADIATION, MODEL INVESTIGATIONS.

V. V. Parin, Iu. G. Grigoriev, E. E. Kovalev, N. I. Ryzhov, N. N. Derbeneva, V. I. Popov, and M. G. Petrovnin.

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite,

Amsterdam, North Holland Publishing Co., 1969, p. 160-170. 7 refs.

In view of the influence of ionizing radiation on crewmen and the appropriate problem of creating adequate radiation protection, it is necessary to investigate the biological effects of cosmic radiation. Under actual space flight conditions, cosmic radiation will affect the human organism in conjunction with other factors. Successful solution of the problem of obtaining appropriate information can be made by a reasonable combination of both ground radiobiological and medical-hygienic investigations and those carried out by using artificial earth satellites. The available experience in carrying out such research and its results are given in this report, Information on the peculiarities of biological effects of protons in a wide spectrum of energy is also included. The report contains data for immediate and later effects of radiation on higher animals and also on many biological objects arranged in various levels of evolution and biological organization. (Author)

A69-37629

RBE VALUES FOR FAST NEUTRONS IN CONNECTION WITH ESTIMATES OF THE RADIATION BURDEN IN SPACE.

E. H. Graul, H. Krüger, W. Rüther, and D. Piroth (Marburg, Universität, Marburg an der Lahn, West Germany).

IN: LIFE SCIENCES AND SPACE RESEARCH VII; COSPAR, PLENARY MEETING, 11TH, OPEN MEETING OF WORKING GROUP V AND SYMPOSIUM ON BIOLOGICAL EFFECTS OF RADIATION IN SPACE, TOKYO, JAPAN, MAY 14-16, 1968 AND MAY 10, 1968, PROCEEDINGS. (A69-37612 20-04)

Meeting and symposium co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, and the International Union of Pure and Applied Biophysics.

Edited by Wolf Vishniac and F. G. Favorite.

Amsterdam, North Holland Publishing Co., 1969, p. 186-194. 19 refs.

Laboratory investigation of the relative biological effectiveness of 14-MeV neutrons on mice, rats, and guinea pigs in the case of general irradiation. Means of suppressing mitosis in isolated cells are also studied. It is found that the value of the relative biological effectiveness is on the order of 2 for the LD 50/30 test; on the order of 2 to 3 for decreasing the body weight of the animals; on the order of 2.5 and 2 for decreasing the cecum weight of rats and guinea pigs; on the order of 2 for inducing hystological changes in the blood and serum albumin of rats and guinea pigs; on the order of 2.5 for the high-sensitivity cells of the pupil epithelium of rabbits; and on the order of 2.5 for suppressing mitosis of Hela cells. It is shown that irradiation with 14-MeV neutrons produces greater damage than gamma-radiation from a cobalt-60 source.

HUMAN OPERATOR DECISION-MAKING IN MANUAL CONTROL.

Harry S. Cohen and William R. Ferrell (Massachusetts Institute of Technology, Dept. of Mechanical Engineering, Cambridge, Mass.). *IEEE Transactions on Man-Machine Systems*, vol. MMS-10, June 1969, p. 41-47, 5 refs.

Research supported by the General Motors Corp.

To decide whether or not to attempt a given maneuver, an operator must consider the likelihood of his success as well as the costs or values of the possible outcomes. Detecting the future success of a maneuver from the physical circumstances and from past experience is formally like detecting signals in noise. Two experiments are described, which indicate that the basic decision model and the relative-operating-characteristic analysis used for signal detection can also be applied to manual control decisions. Results are given comparing the decision performance of operators who execute the maneuvers with the performance of observers who only watch them.

A69-37721

OPERATOR-CENTERED ADAPTIVE COMPENSATION OF CONTINUOUS MANUAL CONTROL SYSTEMS.

Robert P. Lang (Boeing Co., Aerospace Systems Div., Seattle, Wash.) and André G. Vacroux (Illinois Institute of Technology, Dept. of Electrical Engineering, Chicago, Ill.).

IEEE Transactions on Man-Machine Systems, vol. MMS-10, June 1969 p. 53-59 21 refs

Study of an adaptive compensator, which has the function of minimizing the compensation required of the human operator in a continuous single-dimensional manual control system, A random input and a compensatory display are assumed. Use of this compensator does not require detailed knowledge of system dynamics since its adaptive action is based solely upon the operator's control actions. A quasi-linear operator model and the parametertracking model method of measurement are used to provide the required on-line mathematical description of the operator's control actions. Design of the compensator is based upon past results, which show the human operator to be an adaptive controller who introduces compensation, via his control actions, similar to that which would be chosen by a servoengineer in minimizing the square of the system error. The compensator's function results from the established fact that an operator can control a system most accurately when the least compensation is required of him. Experimental results demonstrate that the compensator reduces system error while simultaneously simplifying the operator's task. They also establish some of the limitations of the compensation scheme as currently implemented.

A69-37745

HUMAN VISION.

G. Suits (Michigan, University, Institute of Science and Technology, Ann Arbor, Mich.).

IN: FUNDAMENTALS OF REMOTE SENSING; UNIVERSITY OF MICHIGAN, ENGINEERING SUMMER CONFERENCES, ANN ARBOR, MICH., JULY 14-25, 1969, INTENSIVE SHORT COURSE. (A69-37734 20-07)

Ann Arbor, Michigan, University, 1969. 12 p.

Analysis of the human visual channel as an instrument in remote sensing. It is shown that the human optical system consists of a transducing subsystem and a data transmission and processing subsystem. The response of this system to light levels, color, light adaptation, and flicker is investigated. The perception function of the eye is defined, and visual aids in which the human eye forms the final link are described. These include telescopes, binoculars, magnifiers, microscopes, and stereoscopes. It is shown that optical systems match the requirements of the human eye in such a way that the pupil of the eye becomes the aperture stop in the optical system.

A69-37934 *

HISTOLOGICAL AND HISTOCHEMICAL STUDIES ON THE SUBFORNICAL ORGAN OF THE SQUIRREL MONKEY.

Y. Nakajima (Tokyo Medical and Dental University, Dept. of Anatomy, Tokyo, Japan), T. R. Shantha, and G. H. Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.). *Histochemie*, vol. 13, 1968, p. 331-345. 48 refs. PHS Grant No. FR-00165; Grant No. NGR-11-001-016.

Study of the distribution of several enzymes in the subfornical organ in the squirrel monkey. The nerve cells of this organ show reactions of varying intensity for enzymes of the glycolytic and aerobic pathways. The nerve cells, glial cells, and ependymal cells of the subfornical organ and the choroid plexus are equipped with enzymes of the Embden-Meyerhof pathway, pentose cycle, and tricarboxylic acid cycle. Many nerve cells and oligodendroglia in the body of this organ are rich in enzymes of the TCA cycle and the pentose cycle and thus presumably have the capacity of producing adenosine triphosphate and reduced nicotinamide adenine dinucleotide phosphate (reduced triphosphopyridine nucleotide). The outermost layer of the perivascular sheath gives a positive reaction for enzymes of the glycolytic pathways, whereas the inner layer of this sheath shows negligible activity for these enzymes. On the other hand, the whole sheath exhibits strong staining for magnesium-ion-activated adenosine triphosphatase (ATPase) and moderate staining for calcium-ion-activated ATPase. This sheath, rich in ATPase, may carry on active transport and such related functions.

A69-37973

INFECTIOUS DISEASE HAZARDS IN SPACE FLIGHT.

Paul W. Musgrave (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).

Medical Society of the State of New York, Annual Symposium on Space Medicine, 10th, New York, N.Y., Feb. 9, 1969, Paper, 11 p.

Discussion of infectious disease hazards in space flight due to the unique environmental conditions influencing the transmission, occurrence, and severity of infections from microorganisms which cannot be eliminated from the system. The environmental conditions include confinement, dryness of inspired air, lack of facilities for personal hygiene, zero gravity, altered barometric pressure and gaseous atmosphere, and modified diet. The areas potentially affected by the space cabin environment include membrane function, skin barriers, antibody synthesis and activity, nonspecific humoral elements such as interferon, and fixed and circulating phagocytes. Data returned from a number of space flights on the contraction and spreading of infectious diseases among space crews, and data accumulated in ground-based simulation tests are summarized. B.H.

A69-38001 •

ELECTRON MICROSCOPY OF DNA CONFORMATIONS IN SPINACH CHLOROPLASTS.

C. L. F. Woodcock and H. Fernández-Morán (Chicago, University, Dept. of Biophysics, Electron Microscopy Laboratory, Chicago, III.). (Electron Microscopy Society of America, Annual Meeting, 25th, Chicago, III., Aug. 30, 1967.)

Journal of Molecular Biology, vol. 31, 1968, p. 627-631. 17 refs.
Research supported by the University of Chicago; NIH Grant No.
GM-13243; AEC Contract No. AT (11-1)-1344; Grant No.
NGL-14-001-012.

Description of techniques for the isolation and purification of spinach leaf chloroplasts on a microscale. These techniques make it possible to visualize by electron microscopy the DNA associated with each chloroplast, following disruption by osmotic shock. DNA molecules extracted from purified chloroplasts are also analyzed. Examination of these preparations under controlled experimental conditions revealed two major DNA conformations and a characteristic association with the chloroplast membrane system.

Z.W.

A69-38073 •

SUMMATION OF BAROCEPTOR REFLEX EFFECTS ON SYMPATHETIC NERVE ACTIVITIES.

Ishio Ninomiya and Hiroshi Irisawa (Hiroshima University, School of Medicine, Dept. of Physiology, Hiroshima, Japan).

American Journal of Physiology, vol. 216, June 1969, p. 1330-1336.

Research supported by the Japanese Ministry of Education; Grant No. NGL-49-001-001,

Consideration of the individual and combined contributions of the major afferent baroceptor nerves to the inhibition of sympathetic nerve activity. Semiquantitative measurements of the effect of baroceptor reflexes on the sympathetic nerve activity in the renal nerve reveal that the two carotid sinus nerves and the aortic nerves constitute the major afferent pathways to the vasomotor center. B.H.

A69-38218

ON THE CATASTROPHE IN THE CABIN OF SPACE SHIP "APOLLO-1" AND ON IMPROVED MEASURES FOR THE PRE-VENTION OF FIRE AND EXPLOSION DURING SPACE FLIGHTS.

I. M. Abduragimov and S. A. Iantovskii.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 3-9.) Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 407-411.

(For abstract see issue 07, page 1071, Accession no. A69-18970)

Δ69-38219

PHYSICOCHEMICAL SYNTHESIS OF MONOSACCHARIDES FROM HUMAN WASTES.

lu. E. Siniak.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 9-16.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 412-418. 28 refs. Translation.

(For abstract see issue 07, page 1071, Accession no. A69-18971)

A69-38220

COMBINED EFFECT OF SPACEFLIGHT FACTORS ON PLANTS IN THE KOSMOS-110 SATELLITE.

D. F. Gertsuskii, M. G. Petrovnin, and L. V. Alekseenko.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov. Dec. 1968, p. 17-21.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 419-422. 24 refs. Translation.

(For abstract see issue 07, page 1064, Accession no. A69-18972)

A69-38221

DISORDERS OF CELL DIVISION IN THE BONE MARROW OF RATS IRRADIATED WITH 50-MeV PROTONS.

R. D. Govorun.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 21-25.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 423-425. 13 refs. Translation.

(For abstract see issue 07, page 1064, Accession no. A69-18973)

A69-38222

EFFECT OF A SIMULATED MARTIAN ENVIRONMENT ON CERTAIN ENZYMES.

E. V. Belikova, G. S. Komolova, and I. A. Egorov.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 25-31.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 426-430. 17 refs. Translation.

(For abstract see issue 07, page 1065, Accession no. A69-18974)

A69-38223

IMMUNOLOGICAL AND HISTOLOGICAL STUDY ON THE REACTIVITY OF MICE EXPOSED TO A HYPEROXIC ATMOSPHERE

A. S. Kaplanskii, F. V. Babchinskii, and G. N. Durnova.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 31-35.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 431-434. 13 refs. Translation.

(For abstract see issue 07, page 1065, Accession no. A69-18975)

A69-38224

EFFECT OF HIGH OXYGEN CONCENTRATIONS ON CONDITIONED REFLEXES AND BIOELECTRICAL ACTIVITY OF CERTAIN AREAS OF THE CORTEX AND SUBCORTICAL FORMATIONS OF RABBITS.

N. A. Agadzhanian, I. N. Zakharova, and L. V. Kaliuzhnyi. (*Kosmicheskaia Biologiia i Meditsina*, vol. 2, Nov.-Dec. 1968, p. 35-42.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 435-440. 27 refs. Translation.

(For abstract see issue 07, page 1065, Accession no. A69-18976)

A69-38225

EFFECT OF DIETS CONTAINING UNICELLULAR ALGAE ON THE RECOVERY OF METABOLISM IN PROTEIN-DEFICIENT WHITE RATS.

N. S. Kliushkina, V. I. Fofanov, I. T. Troitskaia, and T. A. Smirnova. (Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 42-47)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 441-444. 8 refs. Translation.

(For abstract see issue 07, page 1065, Accession no. A69-18977)

A69-38226

THEORETICAL APPROACH TO THE SELECTION OF PHYSIO-LOGICAL PARAMETERS FOR THE MEDICAL MONITORING OF SPACE FLIGHTS.

lu. G. Nefedov, A. D. Egorov, and L. I. Kakurin.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov. Dec. 1968, p. 47-55.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 445-451. 35 refs. Translation.

(For abstract see issue 07, page 1071, Accession no. A69-18978)

A69-38227

COORDINATION STRUCTURE OF HUMAN VOLUNTARY MOVEMENTS OF VARYING COMPLEXITY UNDER CONDITIONS OF FLIGHT ON FREE FALL TRAJECTORY.

I. F. Chekirda.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p.

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 452-457.

(For abstract see issue 07, page 1065, Accession no. A69-18979)

A69-38228

EFFECT OF AGE, OCCUPATION, AND PHYSICAL TRAINING ON HUMAN TOLERANCE TO LONG-TERM ACCELERATIONS. P. M. Suvorov.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p.

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 458-461. 28 refs, Translation.

(For abstract see issue 07, page 1065, Accession no. A69-18980)

A69-38229

PERCEPTION OF TIME DURING SHORT-TERM WEIGHTLESS-NESS.

V. I. Lebedev, I. F. Chekirda, and I. A. Kolosov.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 67-71.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 462-465. 5

(For abstract see issue 07, page 1065, Accession no. A69-18981)

Δ69-38230

HUMAN TOLERANCE TO ACCELERATION AT LOW BAROMET-RIC PRESSURES.

A. S. Barer, G. A. Golov, V. B. Zubavin, and E. P. Tikhomirov. (Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 71-76.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 466-469. 13 refs. Translation.

(For abstract see issue 07, page 1065, Accession no. A69-18982)

A69-38231

SOME INDICES OF THE STATE OF THE CARDIOVASCULAR SYSTEM IN OSTENSIBLY HEALTHY SUBJECTS.

M. L. Kolomievskii.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 77-81.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 470-473, 9 refs. Translation.

(For abstract see issue 07, page 1066, Accession no. A69-18983)

A69-38232

CHANGES OF MYOCARDIAL REPOLARIZATION IN HEALTHY PERSONS DUE TO RESTRICTED MOTOR ACTIVITY.

B. A. Korolev.

(Kosmicheskaia Biologiia i Meditsina, vol. 2, Nov.-Dec. 1968, p. 81-86.)

Environmental Space Sciences, vol. 2, Nov.-Dec. 1968, p. 474-477. 11 refs. Translation.

(For abstract see issue 07, page 1066, Accession no. A69-18984)

A69-38264 *

MIDBRAIN AS A SITE FOR THE MOTION AFTER-EFFECT.

Whitman Richards and Robert A. Smith (Massachusetts Institute of Technology, Dept. of Psychology, Cambridge, Mass.). Nature, vol. 223, Aug. 2, 1969, p. 533, 534. 16 refs. USAF-NASA-NIH-supported research.

Consideration of recent electrophysiological data revealing directionally sensitive units in the optic tectum (superior colliculus) of many different mammals, thus indicating that the midbrain may be a plausible site for the motion aftereffect. The motion aftereffect is an illusion of counterrotation which occurs when a viewer, having observed a rotating spiral, continues to watch it when it has come to a stop. The method used in this study separates the functions of the midbrain from those of the striate cortex by observing the effects of selectively modifying the geniculo-striate projection.

A69-38265 *

EVIDENCE FOR A FUNCTION FOR THE UAA CODON IN VIVO. George J. Kantor (California, University, Los Alamos Scientific Laboratory, Biomedical Research Group, Los Alamos, N. Mex.), Stanley Person (Pennsylvania State University, Dept. of Biophysics, University Park, Pa.), and F. Alan Andersen.

Nature, vol. 223, Aug. 2, 1969, p. 535-537. 17 refs.

NASA-supported research.

Study of cells containing no suppressor, a class 1 amber suppressor presumed to insert serine, and a class 1 ocher suppressor also presumed to insert serine. Because it appears that the class 1 ocher suppressor is a transfer RNA with an altered anticodon, rather than another altered cell component affecting the fidelity of the translation, it is concluded that the reduced enzyme specific activity is caused by the translation of UAA codons by the other suppressor transfer RNA.

A69-38266

MOTION SICKNESS-SOME THEORETICAL CONSIDERATIONS. James T. Reason (Leicester, University, Dept. of Psychology, Leicester, England).

International Journal of Man-Machine Studies, vol. 1, Jan. 1969, p. 21-38. 35 refs.

Definition of motion sickness as a pattern of symptoms, mostly nausea and vomiting, which can be evoked in sensitive individuals by the perception of various kinds of periodic motion. It is argued that these reactions may be regarded more usefully, not as isolated phenomena, but as part of a wide range of effects that can be elicited by the experimental technique of "sensory rearrangement." A neural mismatch hypothesis is suggested which holds that motion sickness is triggered by a disparity between current vestibular, porprioceptive, and visual inputs, and those expected on the basis of previous exposure history. It is suggested that wide individual differences in susceptibility may reflect characteristic variation in either the strength of the mismatch signal, the rate at which the neural store is updated, or both. These two functions are seen as the site of possible drug therapy. Immunity to motion sickness may reflect a state of overlearning, and increased resistance associated with age may be due to a reduction in responsiveness to the mismatch signal.

A69-38283

A STUDY ON THE OXYGENATION VELOCITY FACTOR OF THE RED BLOOD CELL BY USE OF THE RAPID FLOW METHOD COMBINED WITH A PT-ELECTRODE AS THE OXYGENATION DETECTOR.

Tomiyasu Koyama, Takeshi Furuse, Takashi Arai, and Masaji Mochizuki.

Hokkaido University, Research Institute of Applied Electricity, Bulletin, vol. 20, Dec. 1968, p. 144-152. 7 refs.

Use of a platinum electrode as a detector of oxygenation of red blood cells in combination with a rapid-flow apparatus in order to overcome certain technical errors inherent in the photocolorimetry method. An attempt was made to ascertain the dependence of the Fc-value on the flow velocity. The method described yielded higher values than those obtained by photocolorimetry, possibly due to the disturbance of the streamline of the rapid flow by insertion of the electrode. The Fc-value for the first 10 msec was found to be comparable to the value reported by Staub et al. (1961). An extrapolation of the average Fc-value vs Reynolds number to zero flow indicated a small value agreeing with the value obtained by the stopped flow method. It is considered that these findings explain the extremely large and small values found elsewhere and support the conclusion of Koyame et al. (in print) that the Fc-value of the red blood cell depends on the flow velocity employed.

A69-38284 *

THE PINEAL GLAND IN RELATION TO REPRODUCTION.

Richard J. Wurtman (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).

(Obstetrical Society of Philadelphia, Centennial Meeting, Philadelphia, Pa., Oct. 18, 19, 1968.)

American Journal of Obstetrics and Gynecology, vol. 104, June 1969, p. 320-326, 31 refs.

NIH Grants No. AM-11709; No. AM-11237; Grant No. NGR-22-009-272.

Discussion of the function of the pineal gland in the production and phasing of ovulation and other biological rhythms. It is noted that the pineal of mammals is not a gland but a "neuroendocrine transducer;" it acts to translate a nervous message into an endocrine output. It responds to a sympathetic nervous input by making a unique enzyme which catalyzes the synthesis of a pineal hormone, melantonin. It is shown that melantonin and other pineal substances act to suppress gonadal growth and cyclicity. It is supposed that the precise locus at which this hormone acts may be the brain. Crystals of melantonin implanted in the hypothalamus or midbrain block pituitary responses to castration. Evidence is given that in the rat, the hamster, the ferret, and certain birds the pineal serves to mediate some of the effects of environmental lighting on gonad function. P.G.

A69-38287 •

TWO TYPES OF LONG MICROEXTENSIONS FROM CULTIVAT-ED LIVER CELLS.

H. Dalen and P. O. Scheie (Pennsylvania State University, Biophysics Dept., University Park, Pa.).

Experimental Cell Research, vol. 53, 1968, p. 670-673. 9 refs.

AEC Grant No. AT (30-1)-3834; Grant No. NGR-39-009-008.

Study of the long microextensions on Chang's human liver cells using a scanning electron microscope. It was found that the end away from the monolayer on some telephase cells sent out long, slender processes which sometimes seemed continuous with one from a neighboring cell, but more commonly terminated in bulbous enlargements which measured 0.3-1.5 micron across and 0.5-4.0 micron long. In other cases, the microextensions showed a bifurcated, branched pattern with enlargements located in the bifurcations. G.R.

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